

Honeywell International Inc.
15102 Minnetonka Industrial Road
Minnetonka, MN 55435

June 21, 2007

Ms. Jena Sleboda
Remedial Project Manager
U.S. EPA - Superfund
77 West Jackson Blvd (SR-6J)
Chicago, IL 60604

Subject: Former Celotex Site
2800 South Sacramento Avenue
Residential AOC Qualifications

Dear Ms. Sleboda:

I am writing to inform you that, pursuant to Paragraphs 11-12 of the Administrative Order on Consent for the Celotex Residential Area, Honeywell International Inc. designates CH2M HILL as its general contractor, Joel Wipf of CH2M HILL as its Project Coordinator, and Arrowhead Contracting, Inc. as the removal action subcontractor.

Joel's address is 8501 West Higgins Road, Suite 300, Chicago, Illinois 60631 and his telephone number is 773-693-3800 ext. 253. Qualifications for CH2M HILL, Joel, and Arrowhead are enclosed along with CH2M HILL's Quality Management Plan. As required, three copies of this combined qualifications document have been submitted.

Please do not hesitate to contact me with any questions (Telephone 952-945-8017).

Sincerely,



Charles O. Geadelmann, P.E.
Corporate Manager, Remediation & Evaluation Services

CHI/Celotex_ResidentialAOC_Quals_Submittal_062107.doc
Enclosures

c: Karen Peaceman/USEPA Region 5 (w/o enclosures)
Daniel Cantor/Arnold & Porter LLP
Joel Wipf/CH2M HILL

US EPA RECORDS CENTER REGION 5



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CH2MHILL TRANSMITTAL

To: Honeywell
1985 Douglas Drive
Mail Stop MN 10-2499
Golden Valley, MN 55422
(763) 954-5418

From: Joel Wipf
8501 West Higgins Road
Suite 300
Chicago, IL 60631-2801
(773) 693-3800 ext. 253

Attn: Chuck Geadelmann

Date: June 21, 2007

Re: Celotex – Residential AOC Quals Submittal

We Are Sending You:

Method of shipment: FedEx 2-Day

☒ Attached

Under separate cover via

Shop Drawings

Documents

Tracings

Prints

Specifications

Catalogs

Copy of letter

☒ Other: See description below

Quantity	Description
1	Main Site AOC Qualifications Submittal, June 21, 2007 – Cover Letter to USEPA, CH2M HILL and Project Coordinator Qualifications, CH2M HILL Quality Management Plan, and Arrowhead Contracting, Inc. Qualifications

If the material received is not as listed, please notify us at once.

Remarks:

Chuck-

Enclosed is the qualifications submittal package that was delivered to USEPA today (June 21, 2007). The original cover letter and 3 copies of the Quals Package were placed on Jena's desk and a copy of the cover letter was placed on Karen's desk.

-Joel

Copy To: Victoria Streitfeld
Honeywell
101 Columbia Road
Morristown, NJ 07962-1139
(973) 455-5281

Daniel Cantor
Arnold & Porter LLP
555 Twelfth Street, NW
Washington, DC 20004-1206
(202) 942-5765

Qualifications Submittal Package Residential Area Response Action AOC

Contents:

- CH2M HILL and Project Coordinator Qualifications
- CH2M HILL Quality Management Plan
- Arrowhead Contracting, Inc. Qualifications

Prepared for USEPA

June 2007



**CH2M HILL/Project
Coordinator Qualifications**

CH2M HILL and Project Coordinator Qualifications



Introduction to CH2M HILL

CH2M HILL is an employee-owned global project delivery company. Since 1946, CH2M HILL has served clients by providing engineering design, construction, and operations and maintenance services on projects in more than 100 countries. We have built our reputation as an industry leader by meeting client needs, working through complex issues, and exceeding clients' expectations. Our commitment to quality and service excellence has resulted in consistent growth. Having begun as a firm of four WW II veterans, CH2M HILL now employs approximately 18,000 personnel in 168 offices worldwide.

The parent corporation of the CH2M HILL organization was chartered as Cornell, Howland, Hayes and Merryfield, Inc., the outgrowth of a partnership in continuous operation since 1946. Several acquisitions and expansions have taken place since then, and the name of the parent organization is now CH2M HILL Companies, Ltd.

We provide innovative services to meet our clients' needs in construction, water, wastewater, regulatory affairs, air quality, hazardous and toxic waste, solid

waste, energy, information management systems, and transportation systems. Our full-service capabilities provide clients with one-stop shopping for environmental consulting services.

CH2M HILL has earned its reputation by delivering reliable project results. The firm has been awarded more than 100 honors from industry associations, such as the American Public Works Association and the American Society of Civil Engineers. Recognized as an industry leader, CH2M HILL has steadfastly earned top rankings in annual surveys of the engineering and construction industry.

CH2M HILL serves a diverse portfolio of industrial clients in all phases of project development, including regulatory negotiations and permitting, public involvement, and examining the cost and value of environmental strategies to design, build, and operate facilities. We supply full-service capability to federal and commercial clients worldwide. Our federal customers include the U.S. Environmental Protection Agency, Department of Defense, Department of Energy, and the National Aeronautics and Space Administration. Our commercial clients include



CH2M HILL U.S. Office Locations

utilities, developers, and the full suite of "Fortune 500" industrial clients.

CH2M HILL offers integrated services that help our clients take any public or private infrastructure project from concept to reality. Every part of our firm is structured to leverage our collective knowledge, which allows us to satisfy each client's unique needs and deliver results that ensure success. We create and operate facilities, infrastructure, and systems that bring clean water, safe transportation, environmental solutions, and convenient communications to people everywhere.

CH2M HILL is an industry leader in using innovative and cost-effective approaches for characterizing environmentally impaired properties worldwide. We have helped guide our clients as site characterization and remediation regulatory requirements have been initiated and evolved. Our combination of understanding local field and regulatory conditions, our globally interconnected staff who capitalize on lessons learned regardless of location, and our focus on site closure helps reduce the time and cost of planning and delivering field investigations. We take a holistic approach by considering future land use, potential exposure pathways, and remedial technologies. We are actively involved in implementing the Triad (observational) approach and shaping its evolution to further streamline the site characterization process. Innovative approaches such as the Triad approach allow us to eliminate unnecessary process steps and facilitate end-in-mind focused and cost-effective investigations. Our goal is to collect data needed to support effective remedial decisions that speed site closure.

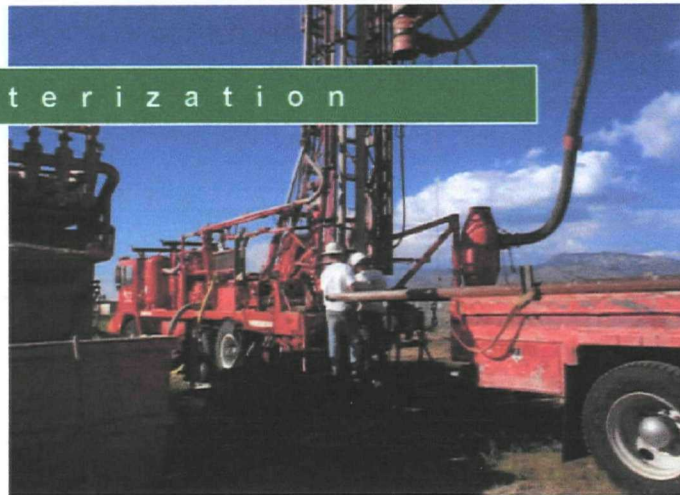
CH2M HILL plans its site characterization efforts with a relentless focus on our clients' business objectives. We develop site closure strategies that meet regulatory requirements, conform to long-term management goals, and accommodate technology constraints. We understand that effective and timely communication among the key decision makers—who represent the technical and regulatory aspects of the project—is a critical success factor.

We help clients save money and time by focusing site characterization efforts on the goal of rapidly moving toward cost-effective site closure through the following techniques:

- Using innovative characterization strategies that focus the investigation toward only the data needed to support remedial decision making

- Acting as our client's advocate while providing effective regulatory interaction and negotiation

- Using innovative field-testing methods to streamline investigations and reduce analytical costs



Innovative Field Characterization Approaches

CH2M HILL implements cost-effective field investigations focused on adequately resolving important uncertainties. We extensively use field screening technologies to reduce the duration and cost of investigations while improving decision making in the field. These tools and strategies support real-time data evaluation, greatly reducing the need for multiple investigation cycles. Innovative strategies that link characterization to risk assessment have been used effectively to reduce the number of samples needed to reach remedial decisions.

In addition, CH2M HILL has been a pioneer in developing streamlined, risk-based approaches that limit and focus characterization efforts to only those absolutely required to achieve a remedial objective. We have helped lead the industry away from the once commonly accepted practice of "full nature and extent" characterization at every site. For example, we have been lead developers and implementers of a variety of characterization/remediation strategies and approaches, including the Perimeter Approach, the Observational Method, Risk-Based Corrective Action (RBCA), targeted contaminant fate and transport modeling, and the use of site specific cleanup target levels at state agency-lead sites.

Data Management and Visualization

CH2M HILL continually upgrades our information solutions, web, and Geographic Information Systems (GIS) management and tools used for data management and visualization to allow our clients to interpret, display, and communicate complex site characterization information effectively. For example, for a private client site in California, we developed a web-based data management and

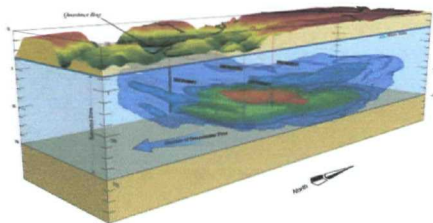
visualization tool that allowed the entire project team (including the client, regulators, and construction subcontractors) to access site data rapidly and display maps in the course of their project work. This approach saved substantial money and time for all parties and allowed for one-stop quality control of critical technical data and real-time, GIS-based documentation of milestone site activities. The client has since expanded the use of this tool to another 16 sites across the United States.

The Triad Approach

The Triad Approach is a work strategy for economically managing project decision uncertainties. It evolved from advances in field data collection and data quality, data management, and communication tools to reduce the cost and amount of time required to conduct a contaminated site investigation. The three legs of the Triad Approach (systematic planning, dynamic work strategies, and real-time measurements) synthesize various, yet conceptually similar, work strategies that are based on an accumulation of technical knowledge and experience from the past 20 to 30 years of work with contaminated sites. As with the application of the Observational Approach to contaminated sites—which was pioneered by CH2M HILL—the Triad Approach acknowledges that uncertainty is an element of a remedial project.

Site Characterization Example Project

Triad Investigation, Site ST-123, Hurlburt Field, FL. The Triad investigation was an intensive 4-month field effort that significantly reduced uncertainties and facilitated site closure. In the systematic planning phase, the project team (which included key decision makers representing CH2M HILL, the Air Force, federal and state agencies, and other subcontractors) established project goals. A conceptual site model and decision process were developed. Data needs and criteria were generated and project gaps were identified. During the decision points, various different technologies were used. Real-time measurements of chlorinated solvents in the gravel aquifer.



CH2M HILL has performed construction services on jobs as small as \$50K and on large-scale remediation programs valued at more than \$7 billion. We have the ability to perform remedial construction under traditional bid-build or fully integrated design-build. We also perform under a wide array of contract mechanisms. We are considered a leader in partnering with our customers to work under innovative, performance-based contracts and guaranteed fixed-price contracts, with or without insurance backstop.

CH2M HILL is a worldwide leader in the use of innovative, cost-effective technical approaches to site remediation. We have completed thousands of remediation projects worldwide, and have successfully applied a variety of innovative, leading-edge remediation technologies.

We are known for implementation of a wide range of soil remediation projects, ranging from massive contaminated soils stabilization projects for refinery and chemical manufacturing clients; to long-term, in situ pump-and-treat programs to treat volatile organic compound (VOC)- and polycyclic aromatic hydrocarbon (PAH)-contaminated groundwater aquifers, worldwide.

Our engineers and project managers also excel in partnering with our clients to deal with soil remediation challenges where the extent of contamination is not fully defined, but schedule does not allow for detailed site investigation. By proceeding with a "most reasonable remedial plan," based on "presumptive remedies" discussed with and approved by regulators, CH2M HILL has assisted numerous clients in achieving economically-reasonable remediation goals, within very tight implementation schedules.

From a technology viewpoint, we have engineered and implemented soil excavation and removals, pervious and impervious capping of landfills and closed lagoons, slurry wall cutoffs and landfill encapsulation systems, in situ oxidation, in situ and ex situ thermal treatment (e.g., underground steam stripping), physical or chemical soil and residue stabilization, and many other tasks. The decisions regarding what technology to implement and which construction approach to use for its onsite delivery are made in close cooperation with our clients' engineers and plant



managers. This ensures that, ultimately, the remediation project meets the client's specific project and broader, enterprise objectives, including operational, economical, or environmental.

Our clients request our help to solve their full range of site remediation and development challenges. For this reason, we maintain a broad base of expertise across the spectrum of remediation technologies and use our technical resource base to design and deliver economical solutions. Our technical remediation solutions are best-in-class because they rely on leading edge technologies to create best-value results for the clients enterprise. Provided below are several project examples for different site remediation technologies.

Soil Excavation

Specific project conditions determine the best-value solution. Often, traditional soil excavation and disposal methods are determined to be the most expeditious and cost-effective solution for our clients. Below are two examples of sites where excavation was determined to best meet the client's objectives.

Rockwell Superfund Site, Texas. Excavated and disposed of approximately 250,000 tons of soil contaminated with heavy metals. Explored alternative options to managing the waste and found that, in Texas, some waste soils can be used as road bedding materials. Because the potential for contaminant migration and exposure of receptors under this approach was minimal, and the method was very protective of human health and the environment, we recommended a change in the disposition of the excavated soils and are currently finalizing a design for stabilizing the excavated soils onsite so they can be used as road bed material. This is estimated to save the project over \$1 million in transport and disposal (T&D) costs.

NAS Cecil Field, Florida. Worked with other team members to develop and implement remedial activities to meet Site Management Plan (SMP)

milestones. Specific activities include soil excavation and confirmation sampling, according to the SMP schedule.

Thermal Treatment

Marzone Superfund Site, Georgia.

We implemented low temperature thermal desorption (LTTD) as the remedy for contaminated soil at a pesticides blending facility. The remedy consisted of building demolition, excavation, and onsite thermal treatment of about 20,000 tons of contaminated soil, and long-term treatment of contaminated groundwater.

Johnston Atoll, Pacific Islands. Completed the \$82 million clean up, treatment, and demolition of all contamination and facilities in 21 months, including thermal treatment of 20,000 tons of soil contaminated with 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD), using indirect-fired thermal desorption

Chevron, Richmond, California. Gained regulatory acceptance for natural attenuation for a trichloroethene/pentachloroethene (TCE/PCE) plume—the first application of intrinsic remediation for chlorinated hydrocarbons in groundwater in California.

Port Arthur Refinery, Texas. Conducted a large-scale composting pilot study for petroleum-contaminated sludges. This technology could save several million dollars, compared to thermal treatment technologies

Soil Vapor Extraction (SVE) and Dual Phase Extraction (DPE)

NAS Jacksonville, Florida. Designed and constructed an SVE system to enhance contaminant reduction in vadose zone and groundwater. To date, the system has removed more than 20,000 pounds of volatile organics.

NAS Whiting Field, Florida. Designed and implemented a pilot study using solar-powered soil vapor extraction/bioventing system at a Comprehensive Environmental Response, Compensation, and Liability Act site contaminated with petroleum and chlorinated solvents. This innovative remedial design used low-level solar power to extract contaminated vapors from the subsurface, using a series of solar panels.

Confidential Industrial Client, Ohio. Used a DPE system to remediate soil containing PCE, TCE, and

1,1-dichloroethene (1,1-DCE) beneath a storage yard. This system combines the lowering of the groundwater table with a high vacuum vapor extraction. Much of the VOC contaminant mass was found to reside in the zone within a few feet above and below the water table. The DPE system consists of a series of DPE wells that pipe to a mobile trailer housing the blower, controls, and carbon vapor emission treatment system. The system has removed approximately 350 of the estimated 750 pounds of VOCs after 3 months of operation.

In-situ Soil Treatment

Dense Nonaqueous Phase Liquid (DNAPL)-Contaminated Site, Union Pacific Railroad, Wyoming.

Developed and pilot-tested innovative remediation technologies including land treatment bioremediation, in-situ bioremediation, biological groundwater treatment, and in situ chemical soil flushing. Developed a cost-effective remediation solution that we implemented at the site, a hydraulically enhanced DNAPL recovery system that involved flushing the aquifer with water to remove mobile or free DNAPL. Field demonstrations provided a basis for full-scale operations that have recovered nearly 1.5 million gallons of oil.

Groundwater/Aquifer Treatment

Groundwater remedies are often required at active and abandoned facilities. Insitu solutions are now typically implemented over more traditional removal and treatment options. Remedy optimization is a standard component of groundwater remedial projects performed by CH2M HILL. Two project examples are provided below.

Naval Air Station, Orlando, Florida. Tasked with re-engineering and installing a biosparge system at a former petroleum outlet at the facility. The system comprised five sparge wells, associated piping, manifold, valves, a blower, and fittings for the 10 CFM system. Periodic O&M activities and quarterly groundwater sampling and analysis activities are ongoing and will be conducted until the groundwater cleanup goals have been achieved.

Massachusetts Military Reservation. Provide technical support and O&M services associated with

10 groundwater pump and treat systems (total capacity of 11 million gallons per day). We completed a pilot test for use of alternative lower cost carbon media. The treatment systems were designed, constructed, and operating within 2 years of alternative selection. Cost savings efforts related to the pump and treat systems included self performance of well maintenance activities, resulting in cost savings of roughly \$50,000.

In Situ Chemical Reduction, (ISCR), Charleston Naval Complex, South Carolina.

ISCR was implemented at two sites, one with TCE DNAPL contamination and the other with hexavalent chromium contamination in groundwater. A colloidal form of zero valent iron (ZVI) was the chemical reductant used for both sites. The ZVI was delivered into the aquifer's target treatment zone using an innovative and patented pneumatic fracturing method, referred to as the Fer-Ox process. One of the significant advantages of this process and one of its more innovative aspects is the ability of the process to be deployed beneath existing buildings and structures without compromising their geotechnical or structural integrity. This ability allowed us to aggressively treat a hexavalent chromium source area beneath a 90-year-old structure without damaging the structure or interrupting ongoing manufacturing operations.

ISCO was implemented to treat three separate areas of groundwater contamination. One of these areas included a former chemical storage site at which groundwater was contaminated with a mixture of chlorobenzene and dichlorobenzene DNAPLs. Other areas included another site contaminated with chlorobenzenes and a site with low levels of the pesticide DDD. These ISCO projects have resulted in more than 90 percent reduction of contaminant concentrations in groundwater.

Many former industrial sites lie idle across the U.S. today. Many property owners are unsure how to recover the value of these depressed land assets, because of possible contamination or residuals in the soil and groundwater. Those in prime urban or semi-urban locations may be fully serviced with infrastructure, including access roadways and railroads. Assisted by a team of experienced property developers and environmental remediation specialists, the value of these properties can be recovered through a well-designed "brownfield" approach to the cost-effective remediation and profitable redevelopment of these properties.

New strategies for dealing with contamination at sites slated for redevelopment are gaining acceptance. Incorporating risk posed by site contamination and the associated remediation needs into the redevelopment design from the outset provides a valuable tool for reducing the scope and cost of remediation, recovering the value of the property and achieving a benefit to the owner, the developer, and the extended community.

Cleanup criteria protective of human health and the environment are determined with a specific future land use in mind, avoiding the open-ended, commonly overly restrictive criteria needed to protect a wide range of potential land uses when no specific use is defined. Innovative approaches, applied during the design, remediation, and construction phases, can lead to tremendous savings using a risk-based contaminant management approach.

Overcoming Obstacles for Redevelopment of Brownfield Sites

When considering a former industrial or commercial property for redevelopment potential, it is critical to develop an early understanding of stakeholder objectives. At the planning, engineering, and implementation stages, CH2M HILL's multidisciplinary redevelopment support team typically provides all or a subset of the following:

- A review of site-specific data regarding the potential human health and environmental risks and how they affect the range of potential redevelopment options.
- A summary of land use options that are marketable, of high value, and are compatible with



future land use, using financial/real estate valuation techniques.

- Assistance in selecting a sound environmental risk-management approach for minimizing the cost of dealing with the remediation liability.
- Support in identifying and addressing stakeholder and community interests in the property, so that a preferred development proposal will be supported by the community.
- Direct assistance addressing entitlements, from land use planning to development alternatives review and decision analysis.
- Engineering design and other support services to deal with all aspects of construction in contaminated areas, such as health and safety of onsite workers, dealing with corrosive or unstable fill soil, handling of toxic, corrosive, or explosive soil vapors, and management of contaminated groundwater.
- Value engineering analyses, e.g., for optimization of earth-moving onsite in order to minimize the amount of contaminated soil that has to be removed from the site.

As a major project delivery firm, we have successfully delivered integrated remediation and redevelopment (as well as associated infrastructure construction) to both private and public clients. Through our work with regulatory agencies, developers, and property owners throughout North America, we have developed innovative, practical, and agency-acceptable solutions that help our clients meet their asset divestiture, acquisition, and development goals.

Project Examples

GPU Energy, Erie Front Street Complex (Grand Phoenix Award Winner for Brownfield Development). GPU Energy's Erie Front Street Complex was awarded the Grand Prize Phoenix Award – the highest national honor in brownfield

development – at the 2001 Brownfields Conference in Chicago. The Phoenix Awards seek to recognize innovative yet practical remediation projects, which bring blighted, old commercial and industrial sites back to productive use. For more than 80 years, GPU Energy's Front Street Station, a 118-megawatt coal-fired power plant, was located along Lake Erie on Presque Isle Bay. The property contained an electric substation, a 120-foot smokestack, fuel tanks, ash dewatering ponds and various other facilities. CH2M HILL was GPU Energy's environmental consultant on the redevelopment project, working collaboratively with the Pennsylvania Department of Environmental Protection (PADEP) to address environmental contamination at the site. CH2M HILL successfully negotiated the release of liability for the site. It was this release of liability that resulted in the commercial investment needed to push this project beyond the start made possible by GPU and the public sector. According to Eric Roland, GPU Energy's Environmental Project Manager, "(CH2M HILL's) responsiveness and professionalism to our demanding needs, has created a positive and professional relationship for GPU, in the eyes of the regulators."

Environmental Liability Management, Koch Industries Inc./Reiss Remediation Co. LLC.

CH2M HILL closed 48 sites and saved a projected \$13 million of the total originally estimated liabilities of \$35 million in the first 2 years. We conducted strategic analysis of remediation alternatives, developed scopes of work and deliverables definition for all sites, and prioritized sites for closure and identified sites for sale of environmental liability

To undertake environmental liability management in a portfolio of sites, CH2M HILL invested funds as a 10 percent equity shareholder in this LLC with the parent petroleum company holding 90 percent. The parent company transferred \$35 million in environmental liabilities, together with a note covering the liability costs, into the LLC. CH2M HILL holds one of six seats on the LLC's Board of Directors and participates in strategic analysis of alternatives to manage the environmental liabilities. CH2M HILL is sharing the risk that environmental liabilities will be remediated in less than the original estimated costs covered by the note. CH2M HILL also conducts some of the remediation work for the LLC, including site investigations, remedial design, and remedial construction. The work is conducted using innovative

contracting approaches such as performance-based fees.

The innovative approach to contracting gives CH2M HILL and other LLC contractors real incentive to complete remediation activities faster and for lower cost than originally projected. The LLC uses a range of environmental liability management approaches, including buying and selling environmental liabilities, regulatory analysis and relationships with regulators, and innovative technologies. The LLC's Strategic Review Team uses a defined process to analyze individual sites and site portfolios. The process involves:

- Evaluating the remediation strategy and alternative strategies focused on closure and exiting the site
- Developing cost estimates and determining the level and type of resource commitments needed for both current and alternative strategies
- Identifying the potential savings achievable under the alternative strategy(s) and developing implementation plans

For the LLC, we developed an environmental project delivery process incorporating the entire project cost to enable re-estimation of remediation liabilities that were significantly underestimated and under-reserved. This included using a strategic plan for each liability that described current conditions, stakeholders, uncertainties, and cost estimates. Consistent use of this plan allows us to prioritize resource for competing projects and minimize the occurrence of cost escalation surprises.

Understanding the real risk to human health and the environment associated with the sites and each remedial alternative is a key aspect of remedy selection. Through modeling we better understand these pathways, communicate them to the regulators, and gain concurrence for the project teams to devise remedial alternatives that effectively address potentially complete exposure pathways while conserving capital and operating expenses.

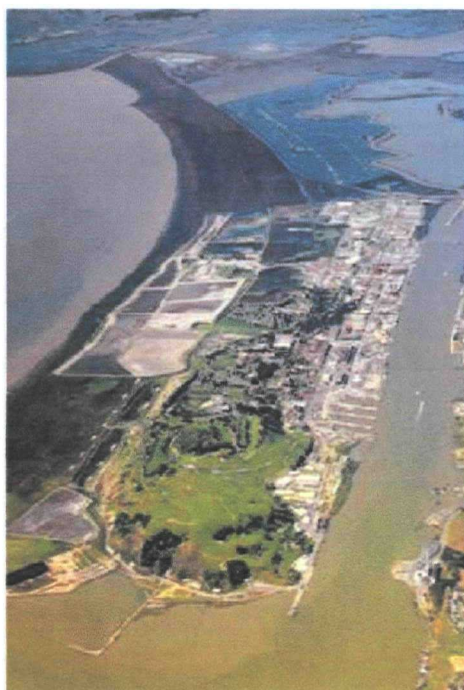
We use innovative technologies which have the highest potential for realizing cost savings at this portfolio of sites. Combining natural attenuation with other more conventional remediation technologies, such as air sparging, soil vapor extraction, or free product recovery, often results in

significantly fewer expenditures than remediation systems alone.

Remediation and Redevelopment, Former Naval Shipyard, Vallejo, California. The City of Vallejo, its master developer, and CH2M HILL developed a plan for the integrated remediation and redevelopment of 640 acres of the Mare Island Naval Shipyard. The land had been used for roughly 150 years for a variety of purposes including shipbuilding, manufacturing, and material & waste storage and disposal. As a result, the land was known to be contaminated with everything from asbestos to PCBs to metals and chlorinated solvents.

In 2001, we began implementing this plan. To date, CH2M HILL has demolished roughly 80 structures, and effectively remediated 46 separate areas of contamination. Examples include UST sites, PCB release sites, and a battery-maintenance area. We are currently cleaning up four structures for use by new tenants.

The shipyard facilities within the property are slated for both recreational and industrial uses. To date, new uses attracted to the site include wine and lumber storage and metal fabrication.



Joel D. Wipf

Chicago, Illinois

M.S., Civil Engineering, Purdue University

B.S., Civil Engineering, South Dakota State University

Years of Experience, Total: 17

Years of Experience, PM: 11

Key Accomplishments:

Experience and expertise in property assessments/characterization, site remediation, and site redevelopment support

Extensive experience in management of industrial site remediation projects under the Illinois Environmental Protection Agency (IEPA) Site Remediation Program (SRP), as well as other state and federal regulatory programs

Experience ranges from standard American Society for Testing and Materials (ASTM) property screening evaluations to soil and groundwater remediation and site closure under various programs

Key PM Successes:

Managed and completed numerous sites entered into state voluntary cleanup programs as part of property transfers or redevelopment, the majority of them in Illinois.

Approaches successfully implemented have saved clients \$250,000 to multiple millions of dollars by driving scope, varying project schedules, and keeping all parties focused on the most important project issues

Managed the environmental assessment and remediation portion of a property acquisition program for a local municipality

Managed underground storage tank removal and upgrade program for a large petroleum company

Managed site remediation for illegal disposal sites

Project Manager, Site Investigation and Remediation, Confidential Manufacturer, Chicago, Illinois. This 240-acre manufacturing facility was constructed in the 1940s by the federal government to manufacture materials for the war effort. CH2M HILL work was performed on behalf of the former property owner. The site, located in the Chicagoland area, was managed under the IEPA SRP. Site investigation and remediation activities required coordination to minimize the impacts on facility operations and were subject to review and approval by multiple parties involved in the property transfer. Provided leadership that led the project team to develop a very successful working relationship with IEPA personnel, as demonstrated by IEPA's quick approval of work plan and report submittals within 2 weeks (without modification) and issuance of parcel-specific Comfort Letters, promising a NFR letter upon completion of all parcels.

Project Manager, Environmental Characterization/Remedial Action at Underground Storage Tank (UST) Farm, Confidential Petroleum Company, Michigan. Historic releases were associated with USTs and the pipeline connecting the barge loading/unloading area to the tank farm. Remediation of the UST area has been completed and closure was granted with deed restriction. Remedial action plans utilizing oxygen release compounds were prepared and submitted to agency for the pipeline release.

Project Manager, Site Assessment/Characterization/Remediation, Job Corps Training Campus, Chicago Dept. of Environment, Chicago, IL. Managed assessment, characterization, and remediation of a 17-acre parcel for development as a job training campus. Investigation conducted on an accelerated schedule to facilitate final construction design and bidding. Site management plan addressing environmental liabilities consisted of limited soil excavation and disposal, impermeable liner placement, clean soil cover, and groundwater pathway elimination. Entered into IEPA SRP, the project involved federal (developer), state (land owner), and local agencies.

Project Manager, Resource Conservation and Recovery Act (RCRA) Closure, Confidential Industrial Manufacturing and Solvent Recycling Facility, Illinois. The facility was in operation for over 40 years and began RCRA closure actions as part of operational shutdown. Multiple investigations were completed to characterize the impacts from various source areas. Free-product removal actions are currently ongoing. The actions also require reaching agreements with adjacent landowners for various forms of institutional and active remedial plans.

Project Manager, Environmental Assessment/Characterization, Property Acquisition Sites, Chicago, Illinois. Managed environmental assessment and characterization of numerous sites being acquired by a local municipality. The purpose of the acquisition was to build public schools and libraries in various communities. Worked directly with the client and regulatory agencies to ensure that all environmental liabilities had been adequately addressed. A majority of the sites were entered into IEPA SRP.

Project Manager, Environmental Assessment/Characterization/Remediation, Site Acquisition, Municipality, Illinois. Managed environmental assessment, characterization, and remediation (where appropriate) of numerous sites acquired by a local municipality for development as public schools and libraries. Worked directly with the client and regulatory agencies to ensure that all environmental liabilities had been adequately addressed. Majority of the sites were entered into IEPA SRP.

	<p>Project Manager, Site Assessment/Remediation for Corporate Merger, Natural Gas Pipeline Compressor Stations, Duke Energy, Indiana, Illinois, Missouri. Led a diverse team from multiple offices. The sites were located in various Midwest states and entered into their respective voluntary site remediation programs. All plans and reports were prepared in accordance with the appropriate agency requirements and the projects were completed under strict time constraints (6-9 months).</p> <p>Project Manager, Hazardous Material Management and Environmental Assessment, Major Metropolitan Airports, Chicago-Department of Aviation, Multiple Locations. Project consisted of the preparation of hazardous substance inventory and evaluation of personal protective equipment, hazardous waste generation and management, and environmental training requirements.</p> <p>Project Manager, Site Remediation, Illegal Dump Sites, City of Chicago, Illinois. The sites contained material ranging from domestic trash to special waste dumped over a period of years as part of an undercover FBI sting operation. Due to the history of the sites, they were considered high profile and were often the topics of the news media. Worked to keep the remediation projects in a positive light throughout their duration.</p>
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CH2M HILL Quality Management Plan

QUALITY MANAGEMENT PLAN

Celotex Superfund Site

Date of Revision: June 2007

Revision 1

Approved _____ Date: _____

Joel Wipf
CH2M HILL, Celotex Project Manager

Approved _____ Date: _____

Mara Hollinbeck
CH2M HILL, Celotex Project Quality
Assurance Manager

Approved _____ Date: _____

Kathy Arnett
CH2M HILL, Honeywell Program Manager

Approved _____ Date: _____

Bob Cipolletti
CH2M HILL, Honeywell Program Quality
Assurance Manager

Note: This Quality Management Plan will be signed after EPA's review and acceptance.

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Appendix

- A CH2M HILL Environmental Services Quality Management Plan
- B Charter Implementation Guidelines

Acronyms and Abbreviations

AOC	Administrative Order on Consent
CQP	Construction Quality Plan
DQI	Data Quality Indicators
DQO	Data Quality Objective
ESBG	Environmental Services Business Group
EPA	U.S. Environmental Protection Agency
HSE&Q	health, safety, environment, and quality
IDP	Individual Development Plan
IT	Information Technology
KA	Contracts and Financial Manager
PARCC	Precision, accuracy, representativeness, comparability, and completeness.
PDS	Project Delivery System
PEP	Performance Enhancement Process
PM	Project Manager
PO	Project Officer
POC	Point of Contact
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
RTL	Review Team Leader
SOP	Standard Operating Procedure
WBS	Work Breakdown Structure

Quality Management Plan

CH2M HILL has prepared this Quality Management Plan (QMP) to support activities being performed at the Celotex Superfund Site. This QMP has been prepared in accordance with *Environmental Protection Agency (EPA) Requirements for Quality Management Plans* (EPA QA/R-2) (EPA, 2001a). Additionally, this QMP incorporates by reference applicable CH2M HILL corporate quality-related plans and procedures.

This QMP has been prepared to describe quality procedures to be implemented under the 2006 and 2007 Administrative Orders on Consent (AOC) for the Main Site and Residential areas. These quality procedures are intended to assure the quality of environmental data collection and evaluation activities related to all aspects of the Celotex Superfund Site scope of work. In addition, the Construction Quality Plan (CQP) submitted as an appendix to the Residential Removal Action Work Plan (CH2M HILL, June 2007), will be followed to maintain quality during the construction related aspects of the project.

CH2M HILL Quality Management System

CH2M HILL is a global project delivery company whose vision is to make technology work to help our clients build a better world. The CH2M HILL mission is to deliver to its clients benchmark project performance through the application of consistent processes, tools, and project management skills.

The objective of the CH2M HILL quality management system is to develop and implement processes and procedures that comply with national quality standards, and provide us the means to satisfy client and regulatory requirements while improving our operations within our Project Delivery System (PDS).

Project Delivery System

CH2M HILL has developed a process-driven PDS that incorporates best business principles and practices and applies them to our operations. Quality management is an essential element of the PDS, which uses processes for Quality Assurance (QA) and Quality Control (QC), and provides Project Managers (PMs) with a consistent, efficient, and effective means of delivering high-quality products and services. PDS involves a six-step process:

1. Planning during procurement
 - Confirm client's vision, select team leaders, develop delivery approach
 - Develop cost structure, clarify contract language
 - Develop change management plan
2. Charter the team
 - Develop the mission, vision, goals, rules, and responsibilities
3. Plan the work—who, what, when, and cost

- Develop project plans and instructions for quality management and for the work to be performed
- 4. Have plan endorsed by all stakeholders
- 5. Perform the work
 - Monitor performance, client expectations, time, money, and quality
 - Plan for change, manage changes
- 6. Close the project
 - Demobilize, archive, record lessons learned

CH2M HILL Quality Management Plan

The QMP uses the process and programs of CH2M HILL and the Honeywell Program, adapted and expanded to satisfy EPA Requirements for Quality Management Plans, EPA QA/R-2 (EPA, 2001a).

The QMP will guide the quality systems and processes used by the CH2M HILL team to deliver professional architect/engineer, technical, construction, and management services in support of the statement of work. Specific procedures for QA/QC of environmental data collection activities are contained in the Quality Assurance Project Plan (QAPP). Other CH2M HILL policies governing major firm wide functions and systems related to quality management are incorporated by reference.

Corporate Health, Safety, Environment, and Quality Policy

It is CH2M HILL's vision to achieve excellence in and be a leader of health, safety, environment, and quality (HSE&Q) performance throughout our global operations. We fulfill the expectations of our clients, staff, and communities through safe, innovative, environmentally sound practices in all our operations.

The following core principles guide CH2M HILL and create a work place that encourages participation from all staff:

- Our management provides leadership and resources that enhance employee awareness and participation and that create a safe and environmentally sound work environment.
- We integrate HSE&Q processes in our business management and project delivery systems, ensuring systematic recognition and reduction of risks to people and the environment, including pollution prevention.
- We require our subcontractors to achieve excellence in HSE&Q.
- We have established occupational health and safety regulations and environmental laws as our minimum acceptable criteria.
- We continuously improve the effectiveness of our HSE&Q programs by setting and reviewing objectives and targets, and report performance metrics to our clients and staff.
- We believe that each employee is responsible for HSE&Q and accountable for its success or failure.

- We encourage staff to exercise sound HSE&Q practices in all aspects their lives, not just at work.

Quality Management Organization

The quality management organization includes members who have primary or associate responsibility for establishing processes, assessing their effectiveness, and implementing actions that result in improvements in quality management. Every member of the organization shares responsibilities for the quality of the items and services we produce.

The authority for developing, implementing, and maintaining Environmental Services Business Group (ESBG) Quality Management Program flows from the President of ESBG to the Global Director of Quality, who directs the implementation of the Program through a network of quality management structure. Part of that structure includes the Quality Management team for the Honeywell program, which has developed specific guidelines for Project Quality Management Plans (for construction and non-construction projects) and is included here by reference. CH2M HILL's Environmental Services Quality Management Plan is presented in Appendix A.

CH2M HILL's key Quality Management Team organization is presented in Figure 1. Key positions and roles relative to quality specific to the Celotex Superfund Site Project are presented below, and illustrated in Figure 2. Further information is also contained in the previously submitted Construction Quality Plan (CQP) as an appendix to the Residential Removal Action Work Plan (CH2M HILL, June 2007).

Project Manager

The Project Manager (PM) is the principal point of contact responsible for communicating with the EPA, client, and internal management teams and is responsible for executing all phases of the project. The PM is responsible for the technical, financial, administrative, and client related aspects of the project and project team. The PM provides leadership and direction to the project staff. The PM directs the creation and implementation of policies and procedures to satisfy company policies, project specifications, and regulatory requirements, including the preparation of work and quality plans.

The PM establishes the objectives, expectations, and scope of work to be performed, in cooperation with the EPA and client management team. The PM plans the approach for accomplishing the project objectives, arranges for staff and other resources needed to execute the work, establishes clear lines of communication, organizes and directs the project personnel and resources, and manages scope, schedule, budget, and progress reporting.

The PM delegates preparation of the QMP to qualified staff, and selects the Quality Assurance Manager. The PM's duties pertaining to quality management include the following:

- Maintains overall responsibility for quality management across the project
- Reviews scope, schedule, and project documents
- Reviews corrective actions and lessons learned to assess the effectiveness of resolutions

- Allocates resources for quality management

Quality Assurance Manager

The Quality Assurance Manager (QAM) is assigned by the PM to provide quality management support to the project team. The QAM reports to the PM for day-to-day operation and is responsible for identifying and communicating quality issues relating to the planning, assessment, and improvement of the quality management system. The QAM reviews and approves the following documentation:

- The Quality Management Plan
- Project Quality Assurance Plans
- Project level work plans and reports
- Construction related plans and estimates

Any revisions to documents reviewed by the Quality Assurance Manager are addressed by the quality assurance staff assigned to the preparation of that particular document.

Dispute Resolution

Every effort will be made to resolve disputes at the project team level, under the responsibility of the PM, in consultation with the QAM when necessary. If disputes arise that cannot be resolved within the project management team, the CH2M HILL Regional Project Delivery Manager and/or Program Manager will be consulted to help resolve the dispute.

FIGURE 1
CH2M HILL Corporate Quality Management Team

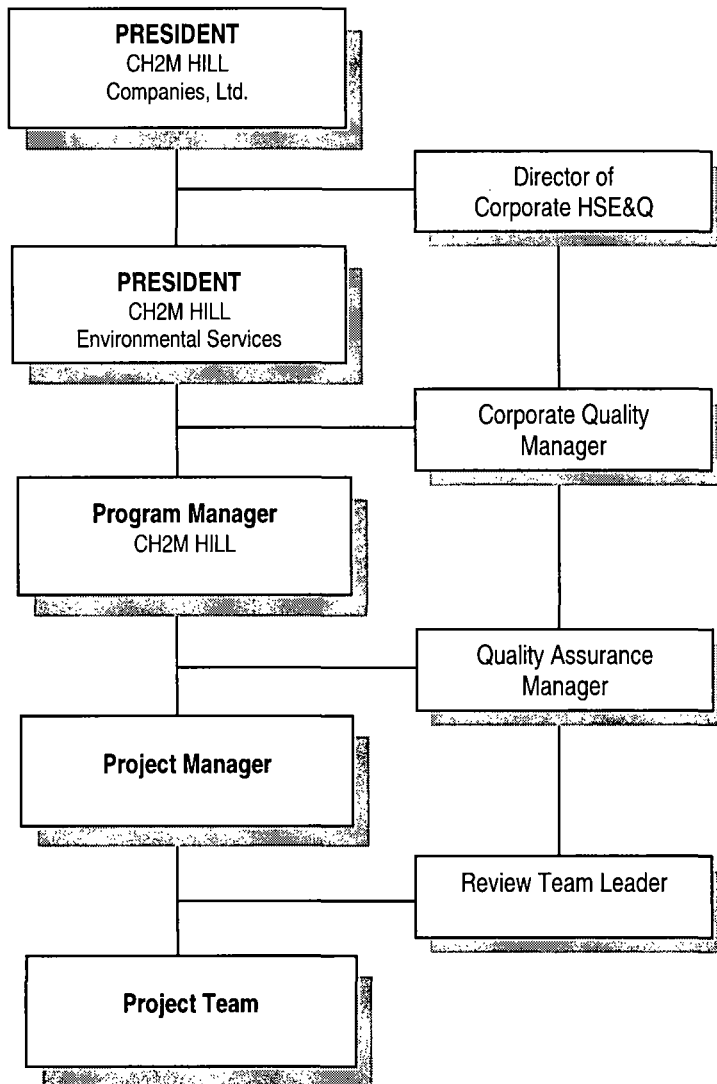
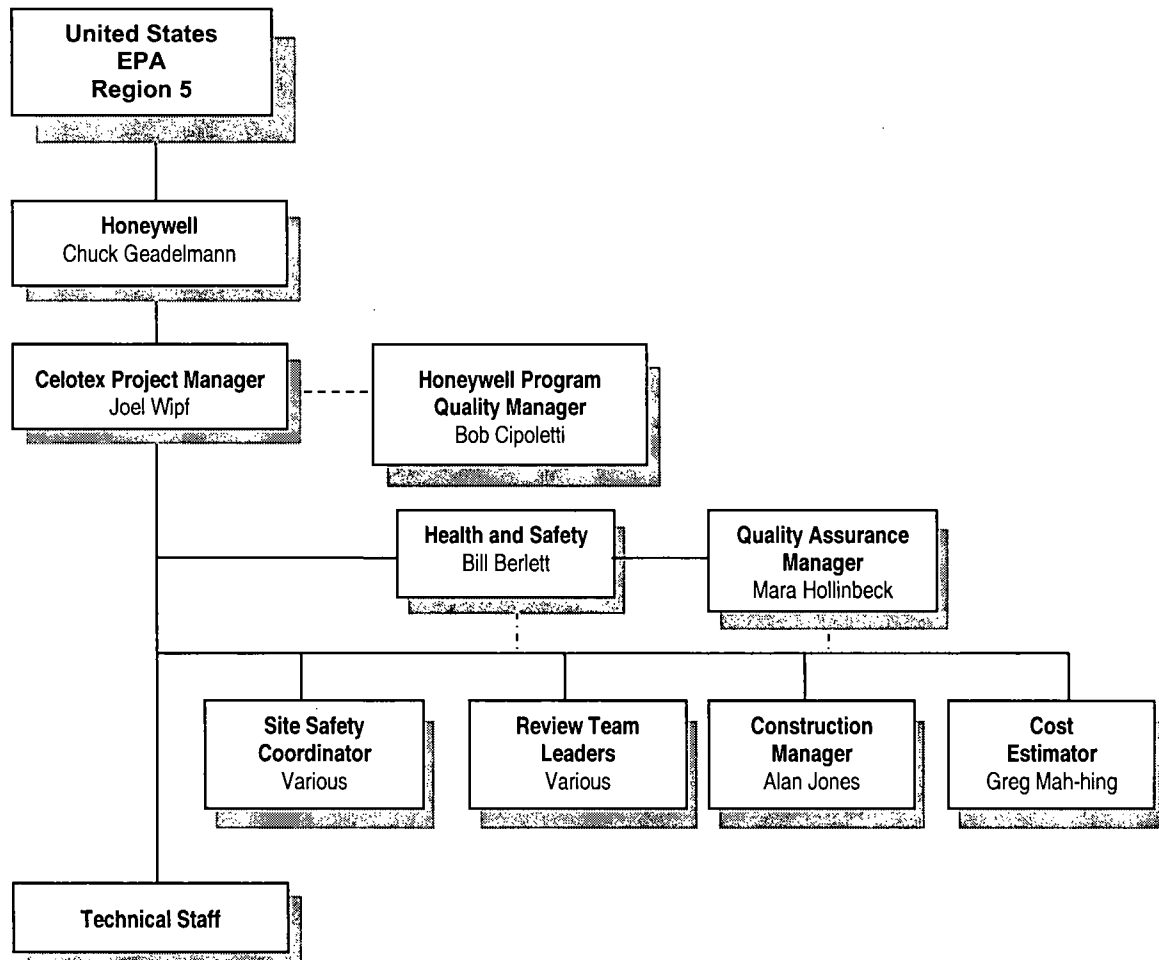


FIGURE 2
Celotex Project Quality Management Team Organization Chart



The QAM evaluates project quality requirements and determines the resources necessary to assess compliance. The QAM trains staff on quality processes and procedures. The QAM schedules, conducts, and reports on the results of project audits and assessments to the PM. The QAM has the authority to stop work until corrections are made if there is evidence that work performance will not meet specifications, company policy, or regulatory requirements, or may result in a hazard to the health or safety of personnel.

Review Teams

The PM, in consultation with the QAM and Honeywell Program, assigns a review team that is composed of senior consultants who have technical expertise appropriate to the work to be performed under a specific task. Review teams assess the project work and sampling plans for adequacy, ensuring that project specifications, regulatory requirements, and technical procedures have been addressed. The review team is responsible for implementation of the QC

processes. The review team is led by a Review Team Leader (RTL) responsible for coordinating the review effort.

The RTL has the responsibility to monitor the scope, quality, and completeness of project reviews, by both ongoing senior consultation and review of project deliverables. The QC process is guided by the RTL, who serves as a technical resource and counselor to the PM.

The RTL is typically an experienced PM or technical specialist who has successfully completed projects of a similar scope and who can help the PM be aware of similar projects and related expertise. Since no one person can be expected to provide the total review, the RTL will work with the PM, QAM and Honeywell Program Technology and Quality Manager to select specialists to review specific tasks and work products. Each technical discipline should be directly involved with the review of its own work. Therefore, the review team size and character will vary with the size and technical requirements of the project.

The RTL can be a key person in bringing other project experience into an assignment and in contacting technical experts who are working on similar issues and problems. The RTL should have frequent communication with the PM, beginning with project planning, to monitor project progress and offer consultation. The QAM evaluates the technical experience of individuals within CH2M HILL to match review team members to review tasks.

The RTL will usually concentrate on the project approach and management and his or her selected areas of technical expertise. While reviews are scheduled and coordinated by the PM, the RTL monitors the quality and delivery of the reviews and works with the PM to resolve differences. The PM is ultimately responsible for timely, well-planned reviews and for incorporating review comments.

The QAM provides training and guidance to the review teams on quality-related issues.

The review team participates throughout the project from preparation of the initial work plan to final deliverable, and provides guidance to the PM.

Quality System Components

The quality system employs procedures that document the quality system requirements. The quality system elements listed below are integrated with general corporate policies:

- Staff qualification and training to secure staff knowledgeable of specific project requirements at the appropriate project levels
- Implementation of the PDS for all projects
- Implementation of Honeywell Program specific quality requirements
- Management assessment and review of the quality system and associated programs
- Procurement policies that provide conformance with required quality standards for purchased equipment and services and that pass these requirements down to subcontractors

- Document controls that ensure the usage of current procedural documents and the protection of project records documenting quality
- Quality improvement process aimed at continuously improving product quality
- Computer hardware and software control

Project-specific quality system elements include the following:

- Planning for the project or key tasks, built around the work breakdown structure (WBS), work plan, project schedule, project budget, staffing plan, and project instructions, as required under the CH2M HILL PDS
- Data Quality Objectives (DQOs) used for effective planning and assessment of data
- QAPPS used to document the data development process and procedures.
- QAPPS are developed based on guidance provided by EPA for Quality Assurance Project Plans (QA/R-5) (USEPA 1998) and EPA Region 5 Instructions on the Preparation of a Superfund Division Quality Assurance Project Plan (USEPA June 2000). Systematic planning process during QAPP development defines the quality objectives and performance criteria.
- Data Quality Objectives (DQOs) are used for effective planning and assessment of data, which includes the following seven steps: 1) statement of the problem; 2) identify the decision; 3) identify inputs to the decision; 4) define the boundaries of the study; 5) develop a decision rule; 6) specify limits on decision errors; 7) optimizing the design.
- Document and design reviews by senior consultants during execution of the project or task
- Incorporating reference documents and guidance documents, as appropriate
- Incorporating other reference documents and guidance documents, as appropriate, that would be appropriate for the project
- Evaluating CH2M HILL quality protocols and incorporating those relevant to the project

The PM has the primary responsibility to implement the processes in accordance with this QMP with support from regional and corporate resources. The Honeywell Management Team is responsible for the overall Quality System components. Table 1 lists quality components, responsible staff, and tools used in implementing the components. Other sections of this QMP contain further description of system components.

Personnel Qualification and Training

One of the keys to CH2M HILL's success is our commitment to employee training and continuous improvement. Training is a cornerstone to long-term project success. We believe it is critical that the capabilities of all employees are improved through a comprehensive training program.

CH2M HILL encourages the professional development of all staff by emphasizing participation in professional societies, preparation of technical publications, academic contributions, and continuing education as elements in the annual personnel evaluations. CH2M HILL compensates employees for approved society activity and education.

CH2M HILL has many training programs for staff depending on responsibility and the needs for skill development. The training programs can be grouped generally as follows:

- Project Management—Training topics for project managers include the following: Project Delivery, Project Cost Control, Project Management, Liability Control, Contract Negotiations, and Contract Management.
- Technical Project Delivery—Training for technical project staff ranges widely across the disciplines used to execute work. Training could include national workshops, local technical seminars, vendor presentations on technology, software training, field training in techniques and field procedures, health and safety training, etc.
- Quality Training—Training in fundamentals of quality, quality control, quality processes, and Total Quality Management principles is provided to all project managers through the CH2M HILL Capstone Seminar Program and the Project Delivery training.

TABLE 1
Quality System Components, Responsible Staff, and Implementation Tools

Quality System Components	Responsible Staff	Implementation Tools
Quality System Documentation	President, Regional Operations	Intra-office webpage on the CH2M HILL Virtual Office
	Vice President, Global Director Health, Safety, Environment, and Quality	Project Delivery System Flowcharts
	Vice President, Domestic Director Health, Safety, Environment, and Quality	Quality Management System Fundamentals
	Infrastructure and Environment Quality Assurance Manager	Developing Project Quality Plans
Training	Honeywell Management Team	Quality Management System Maturity Matrix
	Operation Leaders located in each office	Project-specific Quality Management Plan
	Performance Enhancement Process (PEP) Supervisors	Career Development Framework program
	Project Managers	Annual PEP goals and Individual Development Plan (IDP) process
	Individual Staff	Workload Leveling
		Community of Practice networks
		Continuing Education Credits Brownbag Series
		Lessons Learned and Best Practices Brownbags
		Technology Thursdays Brownbag Series
		Formal training courses
Systematic Planning of Projects	Project Delivery Managers	Mentoring program
	Honeywell Management Team	Conferences, seminars, workshops
	Project Managers	Project Delivery Process Manual
Project-Specific Quality Documentation	Review Team Leader	Standardized WBS and costing spreadsheets
	Project Manager	Scheduling and project control tools
	Contract Administrator	Project Instructions/Chartering Plan
	Project Accountant	Work Plan
	Project Document Control Authority	Subcontract Project Files
	Project Chemist	Project Files
Project and Data Assessments	NER Regional Project Delivery Management	Review Form
	Chemists/Database Group 2nd Party Data Review	Quality Assurance Project Plan/Field Sampling Plan
		Project Reviews (management audit)
		Data Verification and Validation procedures

CH2M HILL has developed these training programs with in-house resources and with outside consultants. CH2M HILL also uses commercial training resources where effective and appropriate to conduct training courses.

CH2M HILL identifies the qualification of trainers based on experience and demonstrated ability to effectively communicate. The effectiveness of training is evaluated by surveys of trainees at the conclusion of every training session. When CH2M HILL develops training programs to meet a particular need for skill development (e.g., project delivery, project cost control, project management, contract negotiations, and contract management, etc.), the program is launched by a "training the trainers" session in the program so all selected qualified trainers are prepared to teach the course materials. Additionally, when CH2M HILL conducts project reviews, we look for opportunities to enhance our training program content through assessment of work performance.

Competence, Training, Qualification, and Awareness

CH2M HILL management selects and assigns personnel performing work that affects quality who are competent based on applicable education, training, skills, and experience.

Staffing Managers allocate people to the identified projects on the basis of their competence and workload. Appropriate records of the competencies are maintained.

The following are the responsibility of CH2M HILL management:

- Determining the necessary competence level for personnel performing activities affecting quality
- Providing training or taking other actions to satisfy these needs
- Evaluating the effectiveness of the actions taken
- Ensuring that our employees are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives
- Maintaining appropriate records of education, training, skills, and experience

There is a Personal Enhancement Process (PEP) that is used for individual professional goal setting in CH2M HILL. The PEP system allows for the combination of individual professional goals along with company targets for strategy and development. The PEP system also allows for estimation of goals realization biannually, and makes corrective steps possible with related training systems. An established Individual Development Plan (IDP), connected with a competency assessment system, allows for planning appropriate training programs for each employee. It also improves employee skills required for specific positions creating highly qualified specialist teams.

The CH2M HILL corporate Learning and Organization Development Group offers a variety of career development resources and tools to help employees enhance their skills. Career Development Frameworks are designed to provide guidance for developing and recognizing those employees who contribute to the success of our firm in the project management, technology, and human resource career paths.

Each Career Development Framework includes competency (or knowledge and skill) development tools and performance enhancement tools to help assess the strengths and development needs of individuals. Learning resources are also available to help individuals improve knowledge and skills in select areas.

CH2M HILL offers many different resources to meet our employees' learning and development needs. All courses offered through the corporate learning program support our core business processes and are usually developed and delivered by our own subject experts in collaboration with the Corporate Learning Group. This collaboration provides course owners with consulting assistance in the areas of instructional design and adult learning to ensure that courses are of high educational value to all participants. By working with course owners, the Corporate Learning group is also able to identify and meet the training needs of the greatest number of employees, while maintaining accurate participation records. Examples of courses developed by the Corporate Learning Group include Project Delivery Systems Training, Construction Subcontracts and Procurement Training, and Introduction to Construction Project Administration.

Numerous additional training methods are used, including online self training modules on the Virtual Office; lunch hour brown bags established by various community of practices, project delivery management, and the site management, ecosystem, and sediments market segments; and both a formal, and an informal mentoring program to connect employees with mentors.

The training needs of technical personnel are monitored within CH2M HILL by Operation Leaders in each office who are responsible for managing the staff assignments and monitoring career growth of the technical staff in their group. The groups are organized generally according to technical practice interests.

The PM is responsible for ensuring that the team has the skills, experience, and qualifications necessary to meet project requirements and to provide project-specific training to the team, as necessary, to understand the technical requirements and perform the work assigned. This project-specific training is tailored to the specific conditions at each site. This training may include review of the WP, QAPP, project instructions, and any other project-specific plans. Actions shall be taken so that the following requirements are accomplished:

- The necessary competence for personnel performing activities affecting quality is determined
- Training is provided or other actions are taken to satisfy these needs
- The effectiveness of the actions taken is evaluated
- Employees are made aware of the relevance and importance of their activities and their contributions to the achievement of the quality objectives
- Appropriate records of education, training, skills, and experience are maintained

During planning, training requirements are compiled based on client, company, and regulatory requirements. Personnel are assessed based on their current qualifications, as well as training required to fill "gaps" in required skills or knowledge.

Training is completed prior to workers performing tasks that have specific qualification or certification requirements. Required training (such as health and safety) provided by

CH2M HILL's corporate training program might be documented separately. Records of this training are available at the project site, when appropriate, or in the office of the project team.

Certifications, licenses, and records of previously completed training (school graduation, courses, etc.) are maintained.

Retraining is performed based on changing requirements such as revision to standards, SOPs, or plans that affect performance. Personnel re-certify as needed to maintain qualification and proficiency.

Procurement of Items and Services

CH2M HILL's procurement system is used to acquire the item(s) and service(s) required while ensuring that the quality of those items are known, documented, and meet technical requirements and acceptance criteria. The system is designed to apply sound business practices to procurement activities and achieve "best value" in acquired item(s) and service(s).

The procurement of item(s) and service(s) is an important part of satisfying client project needs. The procurement system facilitates smooth internal operations and establishes consistent practices resulting in efficient project management.

CH2M HILL's procurement system has been approved by the Defense Contract Management Agency (DCMA). These procedures are located on the company virtual office Web site under corporate groups/contract group/procurement- "Procurement Policies and Procedures Manual."

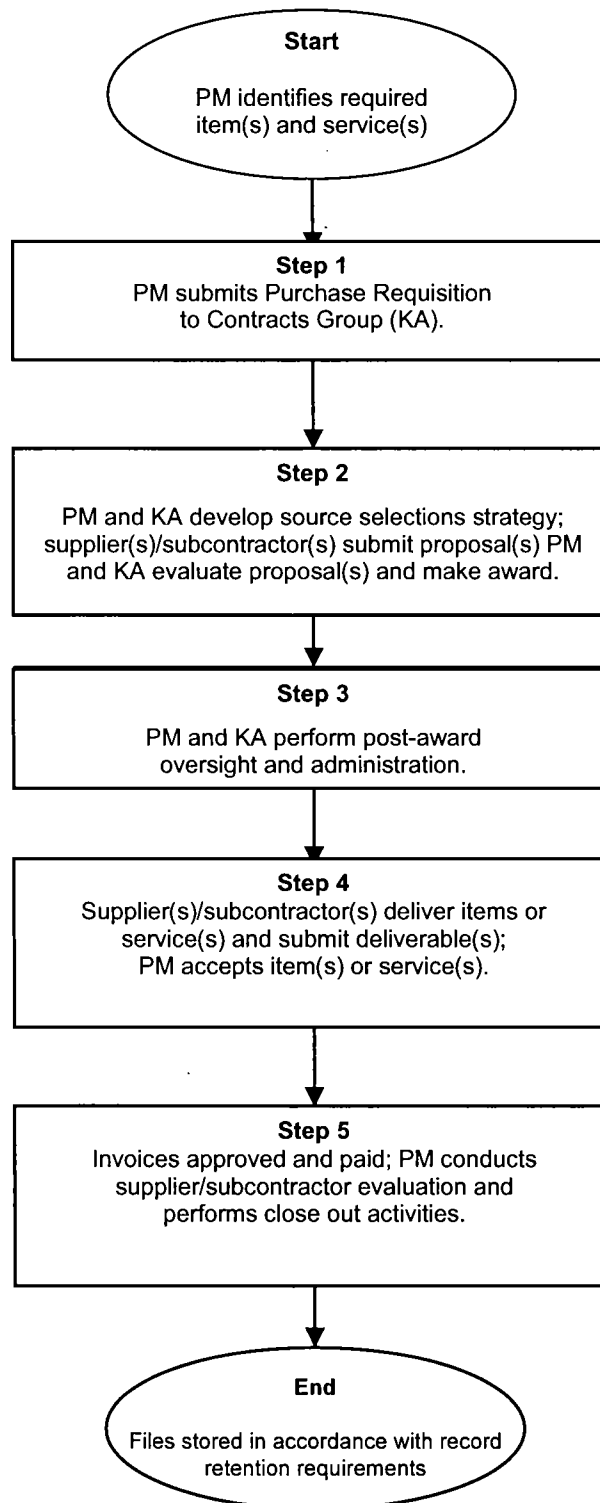
The PM shall initiate project-specific procurement activities by scoping the required procurement efforts in the work plan. The PM and contracts and financial manager (KA) shall use the work plan and procurement system to accomplish the following tasks:

- Determine the item or service needed and submit purchase requisition to Contracts Group
- Integrate the procurement requirements with source selection strategy including quality requirements; receive and evaluate supplier/subcontractor proposal(s) for compliance with selected criteria as stated in the procurement documents; award contract
- Perform post-award oversight of supplier/subcontractor performance
- Accept item(s) or service(s) (PM)
- Approve and pay supplier/subcontractor invoice; evaluate and document supplier / subcontractor performance (maintained in company database) (PM); perform close out

Procurement documents shall specify the item(s) and/or service(s) to be furnished, quality requirements, inspection requirements, documentation or submittal requirements, health and safety procedures; procedures for correction of defective products, and acceptance criteria.

Procurement documents are considered quality records and are maintained in the project records to document the quality of the procurement process. The foregoing five-step procurement process is illustrated in Figure 3.

FIGURE 3
Five-Step Procurement Process Diagram



The process for review and approval of supplier's quality-related documentation starts with the submittals specification, summary submittals registry table, and transmittal form included in the subcontract procurement package. The subcontractor or supplier and CH2M HILL are required to formally communicate and confirm receipt of required submittals. The subcontract documents will specify the subcontractor to transmit submittals to a specific point of contact (POC), such as the KA, the PM, or a designated person. The POC may vary depending on the specific work activity. The designated POC will document the receipt and date on a submittal log form and distribute copies as directed by the PM. The PM will assign the submittal to appropriate team member(s) for detailed review. The reviewer(s) will check the submittal for general compliance with the contract documents and note missing information or deviations. The PM will oversee the review process and help resolve questions regarding compliance with subcontract documents. Review comments on submittals will clearly state whether there is any information the reviewer considers to be missing.

Following the detailed review, the PM will send comments to the subcontractor. The review comments will note whether deviations from the subcontract documents were noted, and whether additional submittals or resubmittals by the subcontractor are required. Approvals by the assigned reviewers will be documented on the transmittal cover sheet with signature and date. Copies of the original submittal, transmittal cover sheet, review copies, and submittal log will be kept in a project submittal file.

Quality Documentation and Records

The management of project documents and records are summarized below. These procedures will be followed by CH2M HILL and subcontractors. CH2M HILL will comply, and instruct its subcontractors to comply, with all document retention requirements of the Celotex Main Site AOC.

Project documents fall into three categories:

- Controlled documents
- QA records
- All other documents

Controlled documents are documents that describe planned activities or work procedures. Document control consists of the following:

- Identifying the document as being a controlled document
- Reviewing and approving the document (by the appropriate authority)
- Identifying documents by revision number
- Determining who is to be issued the document
- Issuing revisions of the document to all copy holders
- Removing obsolete copies from service

QA records are documents that provide objective evidence of quality-related activities. These records are retained as evidence of project quality. They can include evidentiary

records that require chain of custody and confidentiality procedures. Often, documents are both controlled documents and quality records.

Other documents that are neither controlled nor quality records are managed as appropriate to the needs of the project.

The PM identifies the project documents that are to be controlled and those to be project records. The PM should include this information in the project instructions to inform all project staff. The PM is responsible for setting-up project document filing procedures, including these procedures in the project instructions, and informing all project team members about how documents are to be managed.

The PM is responsible for establishing the overall requirements for collection, storage, maintenance, and disposition of project records. The PM is also responsible for controlling the records for a particular project.

Document Control

The PM assigns a staff member, usually the project administrative assistant, as the document administrator. The document administrators become familiar with the information provided in the documents cited in this plan and establish document and record controls that are consistent with their guidance. Document control consists of the following tasks:

- Identifying processes that affect quality and require documentation (both printed and electronic)
- Reviewing the document for conformance to technical and quality system requirements
- Approving the document (by the appropriate authority)
- Identifying documents by revision number
- Determining distribution and use of the document
- Authenticating and issuing revisions of the document to all copyholders
- Withdrawing obsolete or superseded documents and records from service

Proper document identification is necessary to track document production, avoid unnecessary revisions, and ensure proper document distribution. All documents will have a title which will describe whether that particular version is in draft or final form. The footer of each document will include whether that particular version is in draft or final form, and the date when printed. All draft documents which will not be part of the permanent project record will be discarded as soon as the procedure is considered final.

The Document Administrator appropriately formats and identifies work plans, SOPs, and other controlled documents. SOPs are written to conform to the guidance of EPA QA/G-6, *Guidance for Preparing Standard Operating Procedures* (EPA, 2001b). QAPPs shall conform to EPA QA/R-5, *EPA Requirements for Quality Assurance Project Plans* (EPA, 2001c) and EPA/G-5, *Guidance for Quality Assurance Project Plans* (EPA, 2002). The Document Administrator distributes documents to the project team, using only documents that are approved for use, releasing and distributing them in accordance with documented procedures. The Document Administrator verifies that revisions to documents are approved by the Document Approver,

that documents determined to be obsolete are withdrawn from service, and that personnel are aware of their status.

A Document Author is an individual who creates a document. Authors heed applicable portions of the project instructions when creating documents so that documents accurately reflect the work completed.

- The Document Approver is an individual who has authority to approve documents within a specific area or project. The PM determines who on the project staff has document approval authority and to what extent. Approvers approve only documents within the scope of their authority.

Record Control

Standard CH2M HILL document formats will be used for all project documentation. A copy of the template for each common document type (e.g. memorandum, telephone conversation record, letter) are available through Microsoft Word. Technical site observations and information will be recorded in bound field notebooks. Based on project specific requirements, electronic file back-ups may also be created on a regular basis as part of project record keeping procedures.

CH2M HILL identifies and controls documents and records required to demonstrate conformance with quality programs and project requirements. The Document Administrator maintains records so they remain legible, readily identifiable, and retrievable. When necessary, appropriate chain of custody and confidentiality procedures are employed for records that may be required for legal or evidence purposes.

CH2M HILL retains records in accordance with applicable statutory, regulatory, and contractual record retention requirements such as duration, location, and assigned responsibility. Records may be in any format consistent with storage requirements, including hard copy, electronic, or other media. Sufficient records are maintained to furnish evidence of activities affecting quality. These records include field and sample logs and the results of reviews, inspections, tests, audits, and monitoring activity of work performance. The records also include closely related data such as training or qualifications of personnel, procedures, and equipment.

Record/Sample Custody Requirements

A sample is in custody if it is in actual physical possession or it is in a secured area that is restricted to authorized personnel. Proper record/sample custody procedures are necessary to demonstrate that the sample data corresponds to the sample collected. Sample custody procedures will be conducted following project-specific requirements as indicated in the project QAPP, and should include the following;

- Name(s) and responsibilities of all sample custodians in the field and laboratory
- A description and example of the sample numbering system
- Define acceptable conditions and plans for maintaining sample integrity in the field prior to and during shipment to the laboratory

- Examples of forms and labels used to maintain sample custody and document sample handling in the field and during shipping
- The method of sealing shipping containers with chain-of-custody seals
- Procedures that will be used to maintain the chain of custody and document sample handling during transfer from the field to the laboratory, within the laboratory, and among contractors
- Provide for the archiving of all shipping documents and associated paperwork
- Describe procedures that will ensure sample security at all times
- Describe procedures for within-laboratory chain-of-custody
- Document disposal or consumption of samples

Record Retention

Project record retention will be executed following project-specific requirements, including data storage, retrieval, security, and length of retention. The following elements will be specifically addressed in the project's QAPP:

- Data storage, archival and retrieval procedures for all project data, documents, records, and reports. This will apply for both hard copies and electronic data and information.
- Identify specific project documents that will be stored and/or archived
- Identify the organizations and personnel that are responsible for storing/archiving/retrieving specific project documents. Identify the responsible document control personnel, including organization affiliation, telephone, and telefax number.
- Describe where the document will be stored during the project and where the documents will be archived
- Indicate when documents will be archived to a final location.
- Procedures for data security (hard copy and electronic).

Use of Computer Hardware and Software

Computer software acquired, developed, installed, tested, maintained, and used in generating calculations or analysis of data intended for use in documents related to EPA work meets technical and quality requirements and management directives. This includes software used in design, data handling, data analysis, modeling of environmental processes and conditions, operations, process control of environmental technology systems (including data acquisition and laboratory instrumentation).

CH2M HILL's Corporate Information Technology (IT) Group recognizes the need for a disciplined and structured process to ensure that software development activities as well as our network and computing environments are managed with the best industry practices of quality assurance and change management as is appropriate for our business model. Our expectation is that project implementations will have a well communicated scope and be fully tested in a timely manner. Furthermore, changes to our computing and network infrastructure follow a formal and consistent change management process including the use of good communication methods throughout the life cycle of change.

The CH2M HILL IT Quality Assurance team is located in Denver. The group provides software quality assurance services to the corporate IT Technologies and Services group, the Oracle Financial Systems group and the Oracle HR, Benefits, and Payroll Systems group.

The IT QA group provides static as well as dynamic testing of software products. QA becomes involved in projects before requirements are finalized in order to help flush out ambiguities in language and implied needs, and stays involved throughout the design and coding phases, through system testing, and into the maintenance phase. The QA representative can also be the liaison between developers and end users.

The IT group continuously evaluates commercial computer hardware and software for suitability to the firm's activities. The suitability of software is verified before use on projects. For widely used commercial and accepted software, verification consists of checking calculations with known solutions and verifying the input data and the reasonableness of the results. For other programs, such as for the mathematical modeling of groundwater or numerical analysis for statistical work, the program logic is verified by checking that the program solutions conform with similar, previously tested programs or hand calculations.

CH2M HILL Information Technologists assist PMs with verifying the status of software used to generate or analyze data in accordance with the following requirements:

- Controls are implemented for the acquisition of software and software services so that the source of the software is known and is capable of meeting project needs. Procurement documents identify requirements for the supplier's reporting of software errors to the purchaser and, as appropriate, the purchaser's reporting of errors to the supplier.
- Changes to software are documented and the software revalidated after modification to assess and record the impact of changes to user requirements and/or the hardware and software on performance.
- Software that has not been previously approved for use in its intended application (freeware, procured commercial off-the-shelf, or otherwise acquired software) is evaluated by the QAM or the QAM's designee, which may include a CH2M HILL Practice Leader or other knowledgeable person. If it is found adequate, then it is approved for use by project staff.
- Software is maintained and operated in such a manner that its integrity is not compromised. In-use tests and maintenance activities for specialized custom software are implemented to verify that the software is operating within specifications and that the data and information produced from, or collected by, computers meet applicable information resource management requirements and standards.

Quality Planning

The roles and responsibilities of the key quality management positions are described in CH2M HILL's ES QMP included in Appendix A. CH2M HILL's project execution and management are planned in a manner that is consistent with the processes of project delivery, as part of the

processes described previously under Project Delivery System and Quality System Components, and highlighted below:

- The statement of work shall be reviewed and requirements and specifications determined. In evaluating the project requirements and specifications, the project team shall use relevant reference documents or guidance documents, and appropriate CH2M HILL quality protocols. The RTL will be responsible for coordinating with the QAM in ensure proper completion of this activity.
- The PM and staff, including QC staff, shall meet to review the project objectives, scope, schedule, budget, and other expectations in a project kickoff meeting. The goal is to understand key project requirements and expectations for project delivery.

Documentation for a task includes the following:

- Project Instructions that incorporate the background information, information gained at the kickoff meeting, project objectives, WBS, project schedule, project budget, and project staffing.
- Sampling plan, if required, to perform data verification and validation. The sampling plan should include the following:
 - the rationale for sample design, including any assumptions
 - how the data collected will support the project objective stated in the DQOs
 - identify field staff
 - schedule for sample collection
 - sample nomenclature
 - procedures for locating and selecting environmental samples
 - number, and type of samples to be collected
 - methodology to follow during sample collection, and
 - measures for success (metrics).
- The QAPP, as required, to describe the performance criteria used to assess whether the task order contract requirements have been satisfied. QAPPS are developed based on guidance provided by EPA for Quality Assurance Project Plans (QA/R-5) (USEPA 1998) and EPA Region 5 Instructions on the Preparation of a Superfund Division Quality Assurance Project Plan (USEPA June 2000).
- During the development phase of a QAPP, the document will be marked on the bottom left corner as "DRAFT", along with the date in which it was printed. The QAPP will go through internal review for adequacy, completeness, correctness, and conformity with technical and quality requirements. This process will be lead by the Review Team lead, supported by reviewers with specific technical expertise. A document review routing form will be included with each document sent through the review process, along with concise instructions to the reviewers determining the review schedule and budget, area of responsibility for each reviewer, and a description of how the reviewer's comments are to be communicated to the project team.
- The acceptance criteria for analytical results or performance measurements will be based on Data Quality Indicators (DQIs). The DQIs are used in assessing the acceptability or

utility of the data based on precision, bias, representativeness, comparability, and completeness (PARCC).

Data Verification/Validation

The data verification/validation phase of the analytical data provided by the laboratory includes:

- Verifying/validating data according to project specifications and QAPP
- Insert appropriate data qualification flags and final results into the database
- rejecting or excluding results that are redundant, or any unusable duplicates
- generation of a data verification/validation report. And
- submission of this report to the Project Database Manager, Project Manager, and project files.

Implementation of Work Processes

CH2M HILL's work will be performed in accordance with approved plans and technical documents. The PM is responsible for executing all phases of the project, providing leadership and direction to the project staff. The PM directs the creation and implementation of policies and procedures to satisfy company policies, project specifications, and regulatory requirements. The PM arranges for staff and other resources needed to execute the work, establishes clear lines of communication, organizes and directs the project personnel and resources, and manages scope, schedule, budget, and progress reporting.

More specifically, work processes implemented during the mobilization phase of project startup are as follows:

- Project activities affecting the quality of items and services are identified and performed in accordance with documented plans, procedures, drawings, and specifications, as determined during planning, including special or critical operations and processes as well as normal ones.
- Documents are created (including form, content, and applicability), reviewed, and approved as described under Quality Documentation and Records. Documents are revised as required and withdrawn from use when appropriate.
- The Document Administrator controls and documents the release, revision, and use of document management procedures, including any necessary approvals, specific times and points for implementing changes, removal of obsolete documentation from work areas, and validation that changes are made as directed.
- Site personnel, including subcontractors, are trained using the plans, procedures, drawings, and specifications described in the project instructions. Training typically includes familiarization with the project instructions, which describe the project objectives and performance criteria.

- Plans and procedures are periodically assessed. The results of assessments are used to revise procedures as required. Project team members are informed that changes to documents have been made.

The primary tool CH2M HILL uses to implement work processes on a project-specific basis is called the Project Charter. Chartering is a structured process used to guide a project team through the process of defining itself: its purpose, critical success factors, goals, roles and responsibilities, operating guidelines, interpersonal behaviors, and other elements that give a team the clarity of purpose essential for high-quality performance. A chartering session is typically conducted to develop these chartering elements. Careful planning of the chartering session is necessary to help ensure its success. Key questions regarding who should attend the session, the amount of time that will be dedicated, the charter elements that will be developed, and the techniques that will be used, need to be answered to plan the session and to develop an effective agenda.

During the initial chartering session and during follow-up meetings, the team will identify any operations that require procedures for which standard procedures have not already been established. The development of new processes and the withdrawal of outdated processes or procedures can be initiated on any level in the organization, but must be reviewed, approved, and rolled out for implementation through corporate and regional management.

All processes related to environmental data operations will be implemented in accordance with an approved QAPP. QAPP SOPs are prepared and reviewed by senior technical staff with experience in the area(s) covered by SOP. The SOPs are reviewed by the senior review team and specialized staff members who may be external to the project team before the SOPs are incorporated into the QAPP for review and approval by EPA.

Charter Implementation Guidelines are included in Appendix A, and include a schematic illustrating the interaction between the personnel responsible for work processes implementation.

Proper document identification is necessary to track document production, avoid unnecessary revisions, and ensure proper document distribution. All documents will have a title which will describe whether that particular version is in draft or final form. The footer of each document will include whether that particular version is in draft or final form, and the date when printed. All draft documents which will not be part of the permanent project record will be discarded as soon as the procedure is considered final.

Development of Standard Operating Procedures (SOPs)

SOPs are an integral part of the quality system, as it provides the information needed to perform a job properly as well as facilitates consistency in the quality and integrity of a product. SOPs are developed following guidance provided in EPA QA/G-6, *Guidance for Preparing Standard Operating Procedures* (EPA, 2001b), and includes the following process:

- Preparation: processes and procedures to be documented are written by individuals knowledgeable with the particular activity and the organization's internal structure. SOPs are written with sufficient detail so that the process and/or procedure can be

reproduced by a team member with limited experience and/or knowledge of the procedure when unsupervised.

- Review and approval: the SOPs will be reviewed/validated by one or more individuals with the required training and experience. SOPs are approved by a Senior Technical Consultant with expertise in the process/procedure being documented, as well as CH2M HILL's Quality Assurance Manager.
- Revisions: SOPs are updated and re-approved whenever processes and/or procedures are changed. In addition, SOPs are systematically reviewed on a periodic basis (as determined by CH2M HILL's Quality Manager) to ensure that its content remains current, or if the SOP is needed. Whenever reviews and/or revisions are made to an SOP, the review date and revision number is added to each corresponding SOP.

Assessment and Response

The QAM is responsible to the PM for the assessment of the suitability and effectiveness of the quality system and the quality performance of the work to which the quality system applies. The QAM shall evaluate surveillance tools and select those appropriate to the task or program to be evaluated. Tools include audits, management system reviews, peer reviews, technical reviews, performance evaluations, data quality assessments, readiness reviews, technical systems audits, and surveillance (inspections).

Periodically, the QAM conducts internal audits to determine whether the quality system meets the following objectives:

- Conforms to the planned arrangements
- Conforms to the requirements of the quality standards that apply to the QMP
- Has been effectively implemented and maintained

Assessments shall be performed at least annually.

CH2M HILL plans the quality audit program taking into consideration the status and importance of the activities and areas to be audited, as well as the results of previous audits. The assessment process includes management assessments, quality system audits, technical and readiness reviews, and surveillance. The PM and QAM make a determination of the appropriate assessment tools and document them in the project-specific QAPP. Audits are scheduled based on the status and importance of the task or work assignment to be audited.

Audits are conducted by personnel other than those who perform the activity being audited.

Personnel selected to perform audits are trained on audit processes and procedures. Auditors are selected based on their competence, experience, and technical knowledge of the process being audited. The QAM verifies that there is no conflict of interest (i.e., responsibility or direct involvement with the process being audited). Auditors have access to project personnel and information, including managers, documents, and records pertaining to their duties. Auditors have the organizational authority and freedom to perform the following activities:

- Identify nonconformance to client specifications, regulatory requirements, and company policies, as well as areas of positive performance
- Recommend solutions and improvements to project processes and operations
- Independently perform follow-up to corrective actions to verify proper implementation and effectiveness

Corrective Action

Following the audit, the manager (e.g., PM) responsible for the area being audited takes actions without undue delay to eliminate detected nonconformities and their causes. Follow-up activities include verifying the actions taken and reporting verification results.

The QAM establishes and revises procedures for documenting nonconformance, tracking investigation, and implementing actions to correct the issue, including identifying root causes, determining whether the problem is unique or has implications that are more generic, and recommending procedures to prevent recurrence.

Any dispute concerning the resolution of nonconformance, the type or size of corrective action, or the timeliness of response is forwarded to the QAM. The QAM, Project Delivery Leader, and PM jointly resolve disputes.

Quality Improvement

The QAM is responsible for identifying, planning, implementing, and evaluating the effectiveness of quality improvement activities.

The QAM coordinates with the PM concerning processes to ensure that conditions adverse to quality are promptly identified and a determination of the nature and extent of the problem made to prevent nonconformance.

The QAM ensures that all samples analytical results conform to data quality indicators established for the project. In the event that a sample analytical result does not conform with the data quality indicators, the QAM will direct the laboratory to re-analyze the sample, if the sample is within its acceptable holding time; otherwise, a new sample will be collected at, or as close as possible to, the location where the sample was collected.

The QAM monitors to see that that corrective action is taken as soon as practical to prevent reoccurrence and that the corrective action is documented and followed up to assess the implementation and effectiveness in eliminating the issue.

The QAM encourages project staff to establish a dialog with customers and suppliers as a means of communicating issues, problems, or process improvement opportunities that may not be brought to management's attention. The QAM also periodically seeks their input and recommendations as to possible solutions or improvements.

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Appendix A
**CH2M HILL Environmental Services Quality
Management Plan**

Edition 1

Environmental Services Quality Management Plan

January 2007

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A-1	ESBG Global Organizational Structure, Roles, and Responsibilities
A-2	ESBG Business Development Guidance Manual Table of Contents
A-3	ESBG Contracts Administration Guidance
A-4	ESBG Project Delivery Organization, Roles, Responsibilities, and Processes

Appendix B ES Consulting Guidance and Standard Procedures

B-1	ESBG Regional Organizational Structure, Roles, and Responsibilities
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Appendix C ES Construction Guidance and Standard Procedures

C-1	ESBG Construction Services Organizational Structure, Roles, and Responsibilities
C-2	ESBG Construction Quality Management Manual
C-3	ESBG Construction Services ORE Process
C-4	ESBG Construction Standard Operating Procedures Table of Contents

Appendix D Munitions Response Guidance and Standard Procedures

D-1	ESBG Munitions Response Services Organizational Structure, Roles & Responsibilities
D-2	ESBG Munitions Response Quality Assurance/Quality Control Plan Table of Contents
D-3	Operational Risk Evaluation Process
D-4	MR References
D-5	Selection of Teaming Partners/Subcontractors

PD	Project Delivery
PDD	Project Delivery Director (Global)
PDL	Project Delivery Leader
PM	Project Manager
PMRQM	Program MR Quality Manager
PQM	Program Quality Manager
PQMP	Project Quality Management Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
QML	Quality Management Level
QM	Quality Management
QMP	Quality Management Plan
RBDM	Regional Business Development Manager
RCM	Regional Construction Manager
RCQM	Regional Construction Quality Manager
RBGM	Regional Business Group Manager
RFP	Request for Proposal
RFQ	Request for Qualifications
RMSL	Regional Market Segment Leader
RQM	Regional Quality Manager
RTM	Regional Technology Manager
SOP	Standard Operating Procedure
SOQ	Statement of Qualifications
SOW	Scope of Work
STC	Senior Technical Consultant
TM	Technical Manager
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist

D-6 MR Processes and Tasks

D-7 MR Project Reviews

Appendix E List of Referenced CH2M HILL Enterprise- wide Guidance and Standard Procedures

E-1 OCEO Quality Commitment

E-2 Enterprise Quality Platform Document

E-3 HSE&Q Policy Statement

E-4 CH2M HILL QA Manual (Under Development)

Appendix F List of Referenced External (non-CH2M HILL) Guidance and Standard Procedures

F-1 ASTM Standards

F-2 USACE Standards

F-3 USEPA Standards

F-4 ISO Standards

Acronyms

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATFE	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BD&PM	Business Development and Planning Manager
CDC	Controlled Detonation Chamber
CQM	Construction Quality Manager
CQMM	Construction Quality Management Manual
CSM	Client Service Manager
CWM	Chemical Warfare Material
EAC	Estimate at Complete
EPA	U.S. Environmental Protection Agency
EPC	Engineer Procure Construct
ES	Environmental Services
ES QMP	Quality Management Plan
ESBG	Environmental Services Business Group
DDESB	Department of Defense Explosives Safety Board
DGM	Digital Geophysical Mapping
GDQ	Global Director of Quality
GIS	Geographic Information System
GNG	Go/No Go
HSE&Q	Health, Safety, Environmental, and Quality
ID/IQ	Indefinite Delivery/Indefinite Quantity
ISO	International Standards Organization
KA	Contracts Specialist
LTR	Lead Technical Reviewer
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MR	Munitions Response
MRQM	Munitions Response Quality Manager
MSA	Master Service Agreement
MSD	Market Segment Director (Global)
OCEO	Office of the Chief Executive Officer
OQCM	Onsite Quality Control Manager
ORE	Opportunity Risk Evaluation
OSQM	Onsite Quality Managers

A. Introduction

A.1 Enterprise-wide Quality Commitment by Office of the Chief Executive Officer

CH2M HILL Quality Covenant

A Commitment to Client, Employee, and Stakeholder Success

CH2M HILL believes the quality of our services is integral to our business success. Our actions must provide solutions that meet client needs and their expectations, while fulfilling employee and stakeholder expectations.

CH2M HILL defines quality as providing value to customers while meeting their requirements and expectations. Our quality management system involves the planning and implementation of activities to fulfill customer requirements for a product or service, while providing value to both the customer and CH2M HILL.

To sustain our global and diverse business and mission, a well-established organizational framework must ensure systematic and continuous improvement, and provide flexibility for client-specific customization and innovation. CH2M HILL's quality framework emphasizes improving client value-for-service and increasing the effectiveness and efficiency of business support processes, without burden or bureaucracy. We endorse these principles as the pillars of our quality framework:

1. **Client and Stakeholder-Driven Excellence.** Clients and stakeholders depend on CH2M HILL for the right service, at the right time, for the right price. Understanding their needs, meeting their requirements, and striving to exceed their expectations will enable us to deliver the service clients and stakeholders deserve. Agility, personal service, and responsiveness are trademarks of our legendary service.
2. **Systems and Process Perspective.** Successful management of overall performance compels CH2M HILL to view our organization's project delivery and customer value creation cycle as a set of interrelated processes. Achieving desired results requires managing activities and resources as a process and optimizing the function of each process to meet our mission to serve clients effectively and efficiently. Measuring our processes and overall system performance enables management by fact.
3. **Employee Engagement in Continual Improvement.** CH2M HILL believes the person closest to the action, with the proper knowledge, guidance, and support, has the best chance of making the right decision. Our employees are the cornerstone of the organization's success and the source of its excellence. Each employee's personal and professional commitment to a culture of customer service, feedback, and continual improvement must never waver. It is leadership's job to remove barriers to employee success and to architect an environment where excellence and innovation thrive.

A.2 Environmental Services Business Group Quality Policies

The above quoted excerpt from the "Quality Covenant" issued by the Office of the Chief Executive Officer (OCEO) forms the basis for quality management efforts throughout CH2M HILL. As such, the Environmental Services Business Group (ESBG) has adopted the covenant as a foundation for its policies, requirements, and processes outlined in this Plan. The following paragraphs delineate the key objectives of the ESBG Quality Management Program, particularly as they reflect on this Plan's intended use, as well as the overarching policies and principles underpinning the development and implementation of this Plan.

A.2.1 Key Objectives of ESBG Quality Management Program

The ESBG Quality Management Program is intended to achieve the following key objectives:

- Ensure the highest quality of services and products for our clients.
- Affect the highest practicably achievable level of consistency of technical and management practices, across all regions and services of ESBG.
- Serve as the basis for ESBG's operational, risk, and other management practices, including those related to the training and development of our people.
- Provide a robust platform through which specific client-requested quality management requirements can be incorporated and implemented.
- Establish clear responsibilities and accountabilities for key technical and management decisions related to all projects and operational activities.
- Enable the identification and resolution of performance problems and challenges and provide a standing process for corrective measures and continuous improvement of our practices.

A.2.2 Overarching Principles

The ESBG delivers to its clients three interrelated service offerings: consulting/engineering, construction, and munitions response services. As such, its management structure and processes, including this Environmental Services Quality Management Plan (ES QMP), reflect the differences associated with quality management activities for each of these services. Nevertheless, the design and implementation of this Plan are based on the following overarching principles.

- The ES QMP is developed, reviewed, and approved under the authority of the ESBG President and is globally and regionally implemented across the business group under the direction of ESBG's Global Director of Quality (GDQ).
- At the regional level, the ES Regional Business Group Manager (RBGM) will have the overall responsibility for ensuring that the ES QMP, including the quality management requirements of each of the three services noted above (A.2.2, first sentence), is properly implemented.

- The ES Global Director of Quality (GDQ) can approve the incorporation of any applicable and appropriate Client- or Project-required quality management policies, processes, and/or procedures, as deemed appropriate and necessary. These include quality audits of projects, programs or operational units (e.g. region or office) as well as related corrective measures and operational improvements.
- The ES QMP will be revised at least once annually, or soon after any significant structural re-organization at the Enterprise, Business Group or regional levels, or upon the implementation of significant changes necessitated by lessons learned and continuous improvement objectives.

A.2.3 Document Organization

This document is organized into four main sections and several appendixes, as follows.

- Section A Introduction
- Section B Quality Management for Consulting Operations
- Section C Quality Management for Construction Services
- Section D Quality Management for Munitions Response Services
- Appendices A through F

The appendix portion of the document is expected to be the most evolving part of this plan, and subject to enhancements and edits as a result of the continuing evolution of the ES Quality Management Program, changes in CH2M HILL management structures, and advances in environmental technologies and practices.

A.3 ESG Global Organizational Structure and Management Concepts

ESBG is a global enterprise providing full service to a wide array of clients in all sectors of the global economy (i.e. Civil/Infrastructure, Federal and Industrial) and on six continents. In 2006, ESG's total gross revenues exceeded \$400 million, delivered by a staff of approximately 1,400, who operate out of some 100 offices and project locations worldwide. The ESG is organized along a matrix concept, as depicted in Figure A-1.

Essentially, clients are served directly by ESG staff who are part of seven regional operations, each of which includes technical, operational, and project management resources needed for efficient delivery of services locally. Each of the seven regions is led by a Regional Business Group Manager (RBGM) who is responsible for every aspect of developing and delivering work to our clients, as well as the associated overarching functions, such as safety, quality, and human resources management.

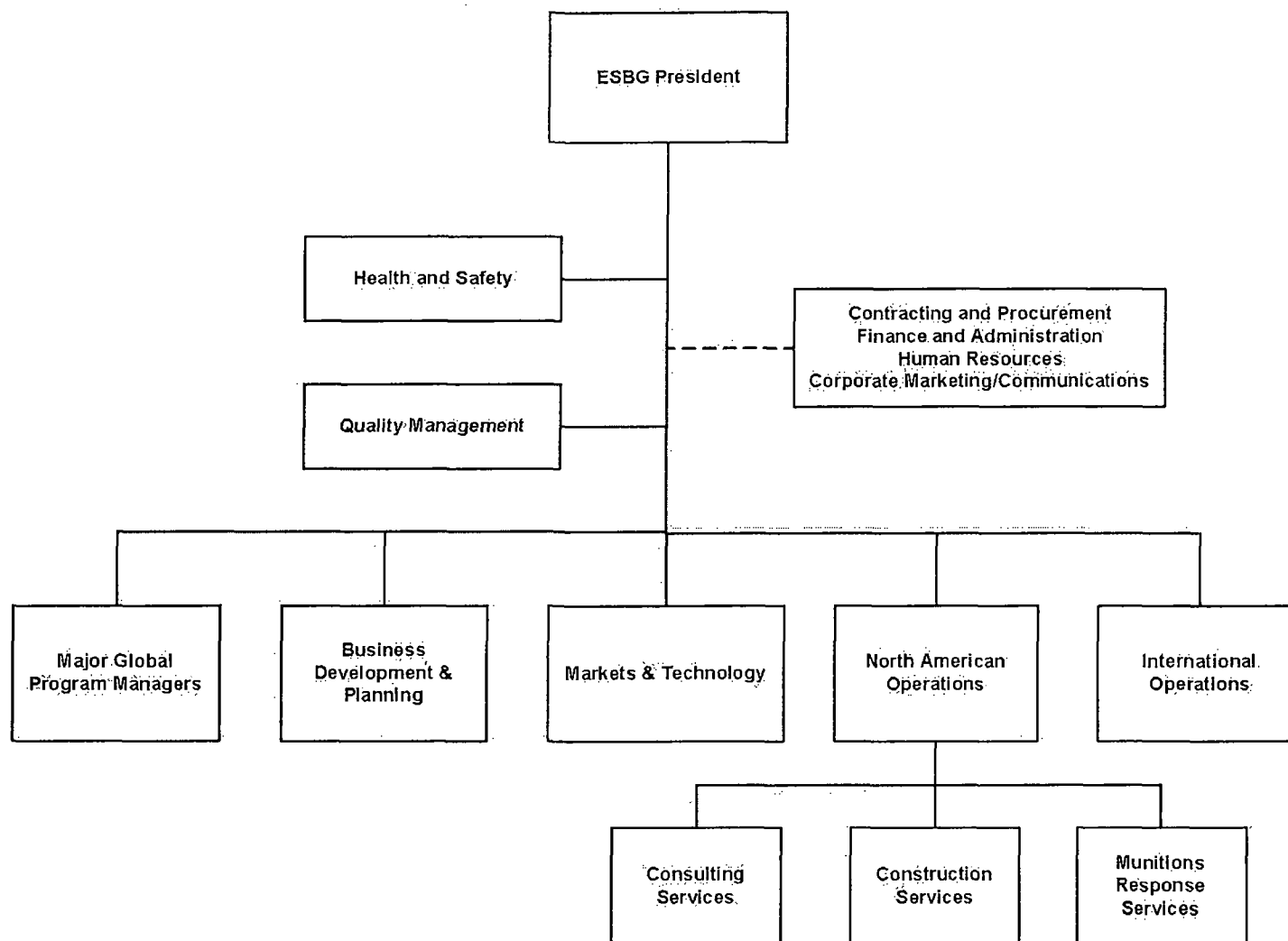
In North America, four regions (Northeast U.S., Southeast U.S., Western U.S., and Canada) report to the Senior Vice President- North American Operations Director. Outside North America, three regions (Europe and Middle East, Latin America, and Asia Pacific) report to the Senior Vice President—International Operations Director.

Although varied in their clients served, staff size, business volume, and market drivers, these seven regions operate in accordance with the same set of Corporate and Business

Group requirements in the areas of technical quality management, health and safety, project delivery and control, contract administration, business development processes, ethics policies, human resources administration, as well as numerous other facets of managing CH2M HILL, a global enterprise with a total staff of almost 19,000 in 2006.

In addition to the two Operations Directors, and ensuring the consistent implementation of above cited requirements throughout the seven operating regions of ESG, are several other Global Directors shown on Figure A-1, all report directly to the President of ESG. These are Directors of: Quality Management, Health and Safety, Business Development & Planning, Markets and Technology, Finance & Administration, Human Resources, and Contracts & Procurement. Regardless of their specific mission focus, these functions achieve their goals for their respective functional areas through setting policies and programs, developing plans and manuals, directing key staffing positions, and conducting audits of systems and projects in the seven regions.

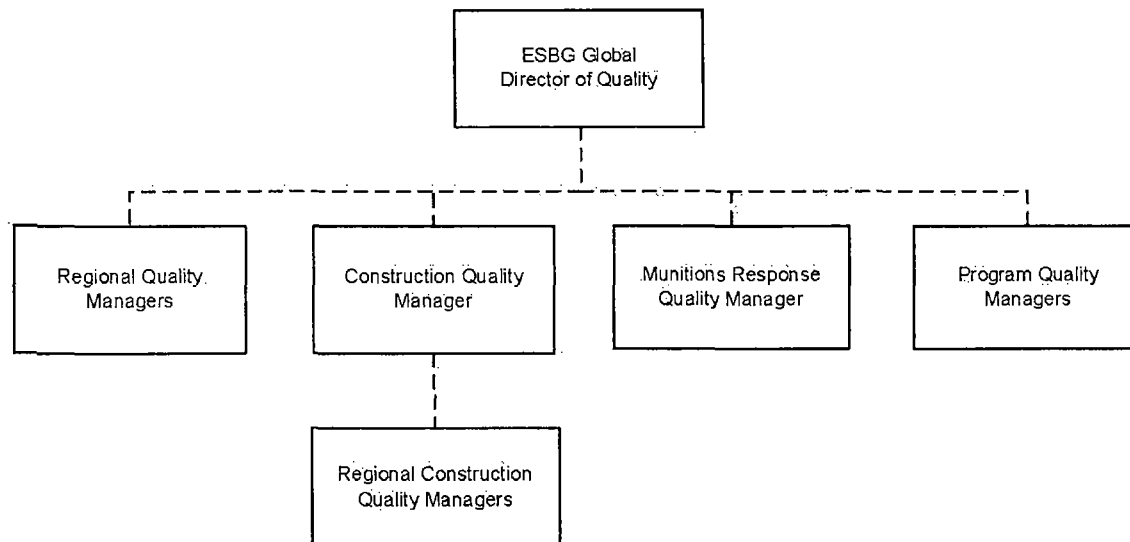
FIGURE A-1.
Global ESBG Organizational Structure (as of January 2007)



A.4 Key Quality Management Roles and Responsibilities

The authority for developing, implementing, and maintaining ESBG's Quality Management Program flows from the President of ESBG to the Global Director of Quality, who directs the implementation of the Program through a network of quality management structure depicted in Figure A-2.

FIGURE A-2
ESBG Quality Management Organization



The following are the key roles and responsibilities related to the development and implementation of the ES QMP.

- **Global Director of Quality (GDQ).** Overall accountability for developing and implementing, monitoring usage, and ensuring consistent and efficient implementation of the ES QMP throughout the enterprise. Conducts appropriate reviews and audits—including any required by clients or directed by senior management—to identify, address, and document QMP compliance problems and corresponding corrective measures, anywhere within ESBG globally.
- **The Regional Business Group Managers (RBGM).** Overall accountability and responsibility for ensuring that the ES QMP is satisfactorily implemented in her/his respective region.
- **Regional Quality Manager (RQM).** Direct responsibility for implementing the ES QMP. Conducts appropriate reviews and audits within respective region—including any required by clients or directed by GDQ or senior management—to identify, address, and document QMP compliance, including problems and corresponding corrective measures within her/his respective region. The RQM is also responsible for providing feedback

on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the GDQ.

- **Construction Quality Manager (CQM).** Direct responsibility for developing and implementing the ES QMP and updating the construction quality plan that is tailored to ESBG's specific construction services, needs, and requirements. Conducts appropriate reviews and audits—including any required by clients or directed by senior management—to identify, address, and document QMP compliance, including problems and corresponding corrective measures, anywhere within ES construction operations. The CQM is also responsible for providing feedback on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the GDQ.
- **Munitions Response Quality Manager (MRQM).** Direct responsibility for developing and implementing Munitions Response (MR) Quality Management Program, including development, implementation, and updating of the ES MR Quality Management Plan (MR QMP). Conducts appropriate reviews and audits—including any required by clients or directed by senior management—to identify, address, and document QMP compliance, including problems and corresponding corrective measures, anywhere within munitions response operations. The MRQM is also responsible for providing feedback on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the GDQ.
- **Regional Construction Quality Manager (RCQM).** Direct responsibility for developing and implementing the ES QMP as well as ES Construction Quality Management Manual (CQMM), within her/his respective region. Conducts appropriate reviews and audits within respective region—including any required by clients or directed by GDQ, CQM, or senior management—to identify, address, and document QMP compliance, including problems and corresponding corrective measures within her/his respective region. The RCQM is also responsible for providing feedback on implementation of the ES QMP and CQMP, and recommendations for additions, changes, and enhancements of the plans to the CQM.
- **Program Quality Manager (PQM).** Direct responsibility for developing and implementing the program-specific quality requirements, in accordance with the ES QMP. In the case of Multi-Regional Programs, the PQM reports to the Global Director of Quality, while in the case of a single-region program, the PQM reports to the Regional Quality Manager.

B. Quality Management for Consulting Operations

In order to ensure the highest level of responsiveness to the needs of our clients and markets, as well as to maintain the highest levels of service quality practicably achievable, the Environmental Services Business Group (ESBG) is organized along a matrix concept, which was discussed in the previous section A.3. Essentially, clients are served directly by ESBG staff who are part of seven regional operations which include technical, operational, and project management resources needed for efficient delivery of services locally to CH2M HILL clients.

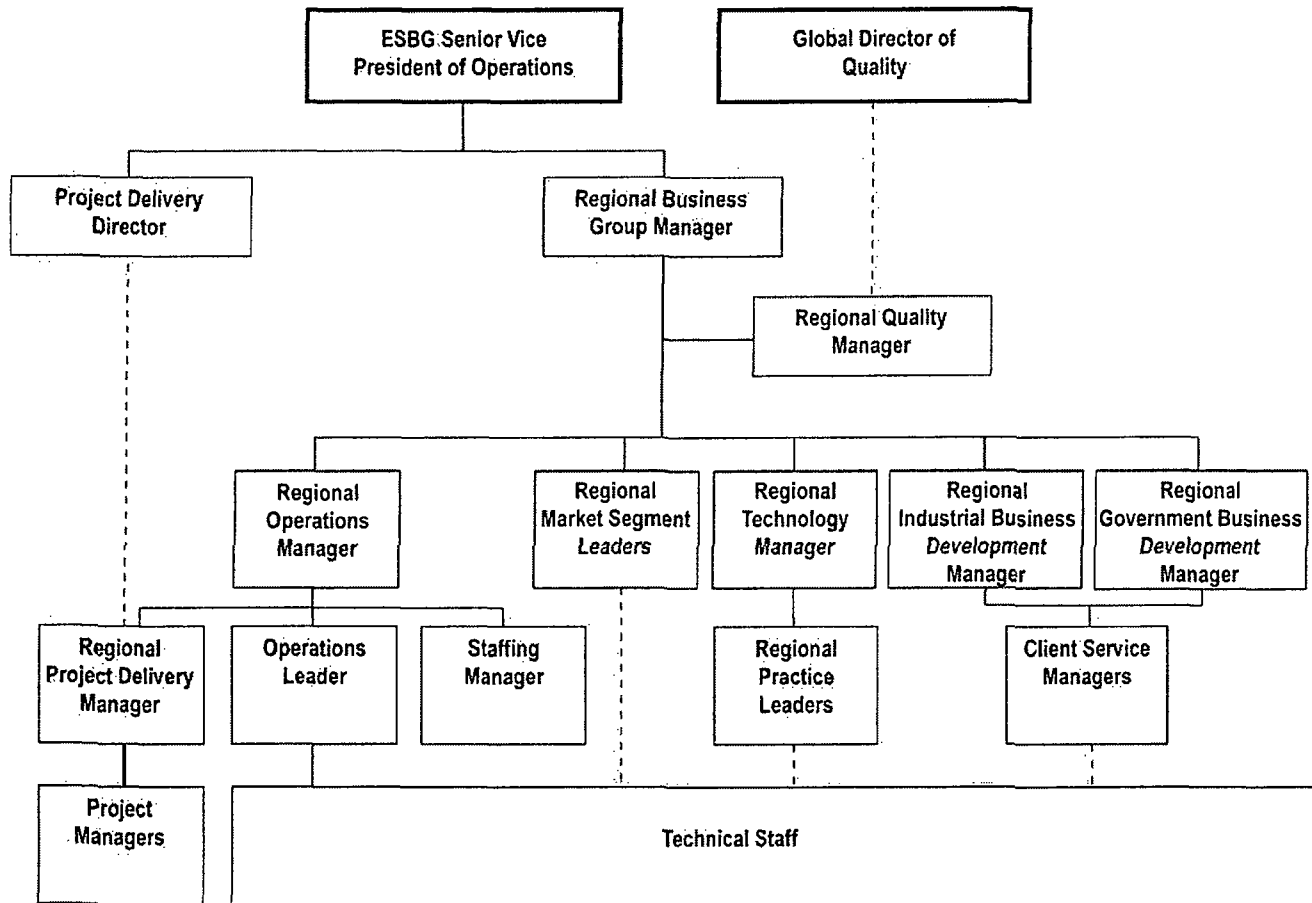
Each of the seven regions is led by a Regional Business Group Manager (RBGM). The RBGM is responsible for every aspect of developing and delivering work to our clients, as well as the associated overarching functions of safety, quality, and human resources management. The organizational concept for the reporting lines of these seven regions is shown on Figure B-1.

As shown on Figure B-1, in North America, four regions (Northeast U.S., Southeast U.S., Western U.S. and Canada) report directly to the Senior Vice President – North American Operations Director. Similarly, outside North America, three regions (Europe & Middle East, Latin America, and Asia Pacific) report directly to the Senior Vice President – International Operations Director. Both Directors report to the President of ESBG.

The following sections include the elements of a regional quality management program for a typical ES Region. The concepts and processes included in Sections B.1 through B.4 are minimum requirements to be fulfilled by each of the seven ES regions under the direction of the RBGM, who is accountable for its development and implementation.

FIGURE B-1

Typical Organizational Structure of an ESBG Region



B.1 Applicability

This section applies to all aspects of ESBG's consulting and engineering operations globally, including the following activities:

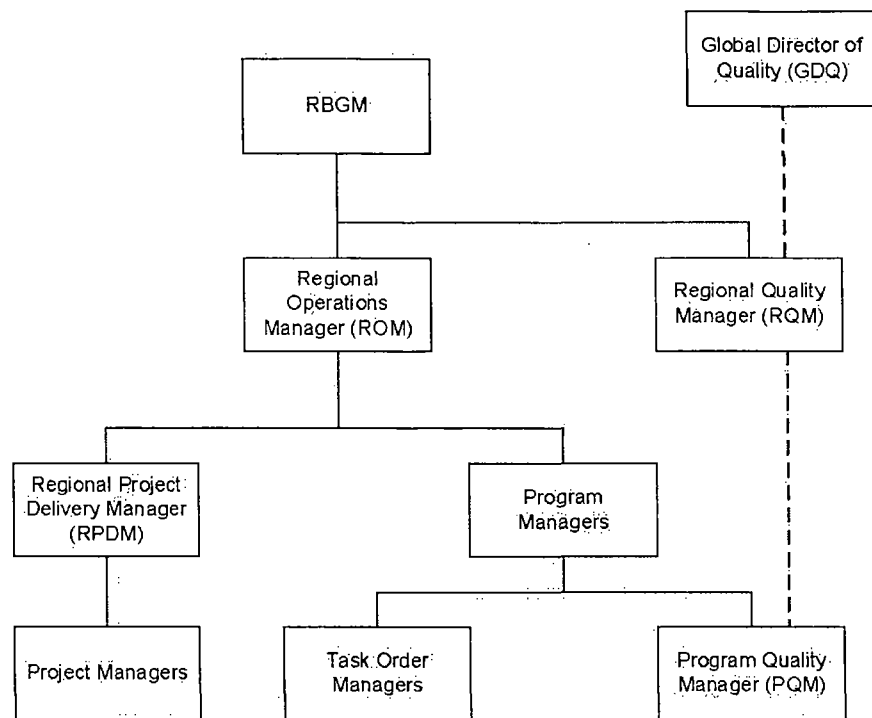
- Development of technical scope of work during positioning and proposals
- Planning and scheduling of consulting projects
- Planning and scheduling of consulting tasks within Construction projects
- Field investigation activities, including reconnaissance and remote sensing work
- Laboratory testing, data validation, and reporting
- Feasibility studies
- Treatability Studies, including bench- and field-scale testing
- Environmental Permitting and Planning
- Conceptual, Preliminary, and Final engineering design work and related development of cost estimates and technical specifications
- Consulting reports of any type

B.2 Regional Quality Management Structure

As stated in Section A.2, ESBG policy requires the RBGM to implement the ES QMP in her/his respective region. A typical organizational structure for a regional business group is shown in Figure B-1.

A typical ES regional quality management organization structure is depicted in Figure B-2 and shows the regional functions reporting to the RBGM. It also depicts the Regional Quality Manager reporting directly to the RBGM, while reporting on a matrix basis to the Global Director of Quality.

FIGURE B-2
Generalized Structure of Regional Quality Management Organization



In the case of regional programs three functional roles that lead and implement QMP on a given project, program, or task, are shown reporting to the RQM. These are: the regional Program Quality Manager (PQM), the Senior Technical Consultants, and Lead Technical Reviewers. In certain cases, any of these three functions may have a different title in accordance with the client's own requirements or needs.

In the cases where work is being performed in a region for a global (cross-regional) program, the PQM reports to the global Program Manager and indirectly to the GDQ with regard to quality management.

B.3 Key Regional Quality Management Roles and Responsibilities

The roles and responsibilities for the key quality management positions depicted in Figure B-2 are described below.

- Regional Quality Manager (RQM).** This is a Region-specific position that reports directly to the RBGM and reports indirectly to the GDQ. The RQM implements EQ QMP, as directed by the RBGM, in accordance with the ES QMP and CH2M HILL quality policies and requirements. The RQM also directs, monitors, and supports the selection and assignment of qualified intra-regional Program Quality Managers for work managed within her/his respective region. The RCQM is also responsible for providing

feedback on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the Construction Quality Manager:

- **Program Quality Manager (PQM).** The PQM plans, implements, and updates the Program Quality Management Plan (PQMP), and ensures the proper assignment and empowerment of key quality-related functions, particularly the Senior Technical Consultants (STC), and Lead Technical Reviewer (LTR), as applicable. The PQMs report directly to the Program Manager, and coordinates, as appropriate, with the RQM and the GDQ functions.
- **Senior Technical Consultant (STC).** This is a project-specific function required on all projects. The STC plans and implements all technical quality management activities needed for the planning and delivery of consulting projects, and associated business development activities. The STC also reviews and signs off on all critical deliverables and correspondences, as agreed to jointly by the Project Manager (PM). In some cases, where the project is relatively small and the PM has sufficient technical competency in the work being conducted, she/he can function as the STC, with the approval of the RQM or PQM, as applicable.
- **Lead Technical Reviewer (LTR).** This is a project (or, as in case of programs and ID/IQ, Task Order)-specific function required for select projects with a relatively complex technical scope of work. The LTR assignment can be made at the request of the PM, RQM, PQM, a client, or ESBG senior management. The LTR participates in the planning stages of the project, and the development of milestones, schedules, and requirements of their quality control (QC) reviews, in collaboration with the STC. The LTR also reviews and signs off on all critical deliverables and correspondences, as agreed to jointly by the STC and PM. The LTR role can be viewed as a level of oversight for the STC, to ensure achieving clients expectations and project objectives.
- **Onsite Quality Control Manager (OCQM)** This is a project-specific function typically required where field activities and measurements are of critical impact on achieving the overall project goals; she/he reports directly to the STC, or in the case of programs, the PQM, and coordinates her/his activities with the PM and STC. The OSQM implements and documents quality management activities included in project and field investigation plans. The OSQM is also responsible for identifying and reporting any deviations or problems to the PQM, the STC, and the LTR, as appropriate, and for developing and implementing suitable corrective measures.
- **Project Manager (PM).** The PM is responsible for overall implementation of the ES QMP on her/his projects, by working closely with the STC, RQM, or PQM. The PM's responsibilities include ensuring that all project personnel, as well as subcontractors, are suitably qualified and trained.

Consulting and engineering-type projects and Task Orders are typically planned and delivered through regional operations and using regional resources. Each project is lead by a PM who reports to a Regional Project Delivery Manager, as discussed in Appendix B-1. Regional QM processes start as early as the BD phases of programs, task orders or projects, and continues through project closeout.

The following sub-sections include discussions of the following regional QM processes:

- Project Quality Management Levels and Implementation
- Proposal Go/No Go (GNG) Process
- Consulting Project Contract Management Processes
- Consulting Project Delivery Processes
- Project Planning, Chartering, and Instructions
- Preparation of a Project Quality Management Plan (PQMP)
- Project Technical Review Process

B.3.1 Project Quality Management Levels and Implementation

The three quality management levels (QMLs) for ESBG consulting projects are described in the following paragraphs. The RQM, in coordination with the PM, has the responsibility for assigning the appropriate level at the outset of the proposal, project, or task order planning stage.

- **QML-1 Project.** This is the basic level with the least QM requirements. It includes relatively small projects or task orders (typically with a labor budget of less than \$100K), with a conventional scope of work for which the PM can serve as the STC. The PQMP for a QML-1 project is typically brief (few to several pages).
- **QML-2 Project.** This level is assigned when the scope of work is sufficiently large or complex where a qualified STC, who has sufficient experience similar SOQs, must be assigned by regional management, and approved by the RQM. QML-2 typically includes projects and task orders with labor budgets up to \$800K and accordingly covers a majority of the consulting work performed in ESBG. For such projects, the PQMP could be as long as hundreds of pages when field investigations are involved.
- **QML-3 Project.** This level applies when, due to certain technical complexity, risk management or other considerations, the client, ESBG Regional, or Global Management request an added level of quality management for technical services or deliverables. In such case, an LTR may be assigned as an independent reviewer of the technical work and reports directly to the RQM, the Global Director of Quality, or their designees, as appropriate.

The determination of a project's QML, often begins at the capture or proposal stage, and could be changed over the life-cycle of a project. During proposal development, the STC is responsible for articulating technical SOW requirements and associated quality management objectives and activities, based on input from client, client service manager (CSM), request for proposal (RFP), or like documents, which typically include client requirements, needs, and expectations. In proposal efforts, assigning a QML must be endorsed by a Regional or Global Functional Manager.

The QML is an important consideration when the project delivery function assigns a risk rating color, in accordance with the project delivery Risk Rating Tool Process Flow (See Appendix B-7). Ultimately, the PM is accountable for the implementation of the ES QMP on her/his project and is additionally responsible for assigning and empowering the role of the STC, and providing direct support and resources needed for the STC's success. In

particular, the PM is responsible for providing an adequate QM budget for the project, which typically ranges from 3 to 8 percent of the total project budget.

B.3.2 Proposal Go/No Go (GNG) Process

The implementation of the QM process, particularly the determination of a project's QML, often begins at the pre-RFP positioning or proposal stage; both are typically led by the BD organization.

Specific guidance relative to the GNG process is included in the "ESBG Business Development Guidance Manual." The manual's table of contents is listed in Appendix A-2 of this Plan.

The following paragraphs provide key and overarching principles that are basic to the typical ESBG GNG process.

- Regional Business Development Manager (RBDM) or her/his designee should approve and document a GO decision for any Regional proposal and assign a Proposal Manager who is qualified to lead the technical, competitive, contractual, and risk management aspects of the proposal.
- Global Business Development and Planning Director is responsible for implementing all GNG processes for Major and Global proposals, in accordance with the requirements of the ESBG Approval Matrix and the Sales Manual, as well as any other ESBG-specific risk management requirements. She/he also assigns the Capture Manager, Proposal Manager, as well as Red Team members, who are qualified to address the technical, competitive, contractual, quality and risk management aspects of the proposal.
- Any positioning, teaming, subcontracting, or other pre-RFP activities performed in advance of a GNG decision that represent a commitment of the firm's name or resources must be approved by an appropriate Regional or Global functional manager. Such manager would also, as needed, ensure the involvement of appropriate senior management and corporate functions (for example, contracts, legal, etc.) during the early positioning and proposal preparation stages, as needed and appropriate.
- To obtain a GO decision to proceed with a proposal effort, a GNG briefing must be presented to regional or global management, as appropriate, and the resulting decisions and recommendations documented and properly disseminated. A typical outline for such briefing, which is required in all cases of QML-2 and QML-3 projects, is presented below, and is further discussed in detail in Appendix A-2.

The Opportunity	Our Approach	Recommendations
<ul style="list-style-type: none"> • Background • Client and Positioning To-Date • Scope of Work and Deliverables • Project Schedule • Procurement Highlights <ul style="list-style-type: none"> – Budget, Revenue, and Profitability – Key Milestones and Schedule – Key Term and Conditions • Strategic Value • Competitive analysis 	<ul style="list-style-type: none"> • Key Strategies <ul style="list-style-type: none"> – Teaming and Alliances – Positioning – Project Leadership – Key Staff – Subcontracting – Pricing – Insurance • Resource Needs <ul style="list-style-type: none"> – Proposal Team – Proposal Schedule – Teaming and Subcontracting – Budgets 	<ul style="list-style-type: none"> • Technical Risks and Mitigation • Delivery Risks and Mitigation • Health and Safety Risks and Mitigation • Environmental Risks and Mitigation • Contractual Risks and Mitigation • Political/Institutional Risks and Mitigation

B.3.3 Consulting Project Contract Management Process

Contracts terms and conditions have great impact on CH2M HILL's ability to plan, secure funding, and deliver projects successfully and in accordance with the highest technical standards our clients expect of us. Therefore, timely and, oftentimes, early engagement of the contracts function in the capture and procurement stages of a project are necessary; these elements are discussed in detail in Appendix A-3 "ESBG Contracts Administration Guidance".

The following paragraphs provide principles that are basic to typical ESBG consulting contract review and administration processes:

- The ESBG Director of Contracts is responsible for assigning a qualified KA to each proposal, project and contract negotiation effort. The KA reviews terms and conditions and documents any which are considered severe or unusual for incorporation into the GNG process and proposal risk management planning and pricing.
- The Project Manager or Proposal Manager, depending on project phase, is responsible for ensuring the review of any and all contractual terms and conditions, as well as associated communications, by a qualified Contracts Specialist (KA).
- The Proposal Manager will ensure company required documents, are completed by the proposal team. The KA will audit to ensure the necessary documents are completed and approved prior to submission.
- The KA will ensure that the appropriate estimate review sign offs have been completed prior to submission of final proposal
- The KA will provide the Proposal Manager and Project Manager a contract brief which summarizes all key contractual elements of the contract, including but not limited to notice requirements, payment terms and limitations, authorized representative, liquidated damages or penalties, schedule milestones, differing site conditions clauses, and any other special contract conditions of which the proposal and project should be aware.
- The Project Manager, in coordination with the KA, is responsible for ensuring that the Health, Safety, and Environmental performance of subcontractors is reviewed and

approved by the Responsible Health and Safety Manager prior to entering into teaming agreements or contracts with subcontractors.

- The KA is engaged in all associated contract compliance activities associated with project execution and any and all, subcontracting activity, changes to the contract Scope of Work and contract terms and conditions.
- During business development efforts including proposals, the business development function is accountable for engaging both project delivery and contracts functions in the effort, in accordance with ESBG established authority guidelines and Approval Matrix.
- During contract negotiations and project execution, the Project Delivery function is responsible for engaging the contracts function in the effort, in accordance with ESBG established authority guidelines and Approval Matrix.
- Project Delivery Director (PDD) reviews contracts for large, complex and high-risk projects, particularly Master Service Agreements, Performance-Based, and Fixed-Price contracts. The PDD may also lead the negotiation of terms and conditions, with the proper support of the contracts, legal, and insurance functions.

B.3.4 Consulting Project Delivery Process

The Project Delivery (PD) function owns responsibility for the initiation and support of the Quality Management process at all levels of project contract negotiations through closeout. In an ESBG Region, the PD function is led by the Regional Project Delivery Manager (RPDM) to whom all PMs report. At the Global level, the PD function is lead by the Global Project Delivery Director (PDD). Each multi-regional Program has a PDM who reports directly to the PDD or her/his deputy. A detailed discussion of the project delivery function in ESBG is provided in Appendix A-4 "ESBG Project Delivery Organization, Roles, Responsibilities, and Processes". The following paragraphs underscore some overarching concepts of project delivery throughout ESBG and at all levels.

- The PD function is responsible for assigning a qualified PM to each project within her/his respective purview. The PM, in turn, will be responsible for all aspects of the project, including the implementation of all quality, health, safety and risk management processes, as appropriate and required.
- During positioning, capture, and proposal development stages, the appropriate PD manager must be consulted regarding any PM names assigned in a proposal, or otherwise conveyed to the client, as well as any project delivery issues impacting quality, health & safety, cost, schedule, or risk of the project.
- The PM, in coordination with the KA, is responsible for ensuring that the Health, Safety, and Environmental performance of subcontractors is reviewed and approved by the responsible Health and Safety Manager prior to entering into teaming agreements or contracts with subcontractors or potential partners (e.g. in JV, LLC, etc.).
- The PM is responsible for implementing all requirements of the ESBG Project Delivery function, as outlined in the Project Delivery Manual (Appendix A-4).

B.3.5 Project Planning, Instruction, and Chartering

The PM has total responsibility for planning and implementing all aspects of the project. Before commencing the execution of any project task, the PM plans and facilitates a "Chartering Meeting." The chartering meeting is attended by key project staff and task leaders (including the STC), as deemed appropriate by the PM and PQM, to ensure full understanding of project objectives, scope of work, work tasks, organizational roles and responsibilities, budgets, milestones, and deliverables. In particular, the Chartering Meeting must achieve- at a minimum- the following objectives.

- Review client and project background, as well as related documentation, e.g. RFP, GNG briefing, risk management guidance and proposal.
- Review and fully understand the project contract and subcontracts.
- Discuss project objectives and corresponding scope of work.
- Outline necessary field logistics and subcontracted services.
- Review project organization and key roles, responsibilities and authorities.
- Outline and discuss communication requirements, protocols and plans.
- Develop and/or finalize milestones, schedules and deliverables.
- Outline and launch the development of project plans, instructions and Project Quality Management Plan (PQMP).
- Obtain management endorsement of project plans and resource needs.

See related guidance in Appendix B-2 Project Planning, Instruction, and Chartering.

B.3.6 Preparation of Consulting Project Quality Management Plan (PQMP)

The PQMP is the single most fundamental tool for quality management in ESBG.

Accordingly, each project or task order managed in ESBG must have a PQMP, which provides sufficient information to accomplish the following.

- Successfully deliver the project scope of work.
- Achieve client satisfaction.
- Meet CH2M HILL's technical, management, and safety standards.
- Maintain compliance with contract terms and conditions, project specifications, and project/program requirements.

Appendix B-3 includes detailed guidance and templates for the preparation of a PQMP. The following paragraphs, however, provide key highlights of such guidance.

- A PQMP could be as brief as a few pages (for example, for conventional and relatively small consulting assignments) or as extensive as several volumes (for example, for large remedial investigation/feasibility study-type projects).

- The size and complexity of the PQMP depends on the scope of work, complexity, and duration of field investigation tasks, risk management considerations, quality management level, client requirements and expectations, as well as CH2M HILL's own technical, management, and safety standards and expectations. At a minimum, a PQMP should include a summary of the project work plan, a table of deliverables, milestones and schedule, as well as a list of the key staff.
- The PM and STC are jointly responsible for developing and maintaining a valid and up-to-date PQMP. During project execution stages, the PQMP is considered a dynamic tool that continues to reflect any changes of the scope of work, technical procedures, milestones, deliverables, and/or schedule.
- During the project execution stages, the STC, in close cooperation with the PM, plans and directs the execution of the technical scope of work (SOW) in accordance with the PQMP, and communicates, as appropriate, with the LTR (if assigned) to ensure the efficient implementation of the QM Review process.

B.3.7 Project Technical Review Process

Periodic technical reviews of projects are required to ensure meeting client and project objectives, ensure compliance with the PQMP, and mitigate technical and other project risks. These reviews are typically conducted separately from those completed by PD organization, which typically are focused on schedule and budget control. The frequency of technical reviews will be jointly determined by the PM, LTR, and STC. Reviews may also be requested by the RQM, PQM, or senior management. Project technical reviews typically address the following SOW aspects, as appropriate.

- Status of project plans with emphasis on changes, their reasons, and impacts
- Technical strategies and their adequacy to achieve the client's end result, in particular, the applicability of any innovative or creative methodology or techniques, to achieve project objectives more cost-effectively, efficiently, and/or quickly.
- Review of safety issues associated with project implementation.
- Completion status and quality of completed work.
- Problems and challenges encountered and their resolutions.
- Customer relationship and feedback.
- Budget and schedule status as they reflect on technical work.
- Any other project aspects that have been targeted for monitoring in the PQMP or otherwise identified to be of potential impact on deliverable quality or timelines.

The findings from, and documentation thereof, resulting from a technical review must be reported to the PD function by the PM, since it represents a valuable basis for evaluating overall project status regarding cost, schedule and contract compliance.

C. Quality Management for Construction Operations

In order to ensure the highest level of responsiveness to the needs of our clients and markets, as well as to maintain the highest levels of service quality practicably achievable, the ESBG is organized along a matrix concept. Essentially, clients are served by ESBG staff that are part of regional operations and include all construction, technical, operational, and project management resources needed for efficient delivery of services.

Each region includes a Construction Services Department which is led by a Regional Construction Manager (RCM). Within her/his respective region, the RCM is responsible for every aspect of developing and delivering construction projects to our clients, as well as the implementation of the associated overarching functions of safety, quality, and human resources management. A typical organizational structure for an ESBG regional construction department is shown on Figure C-1.

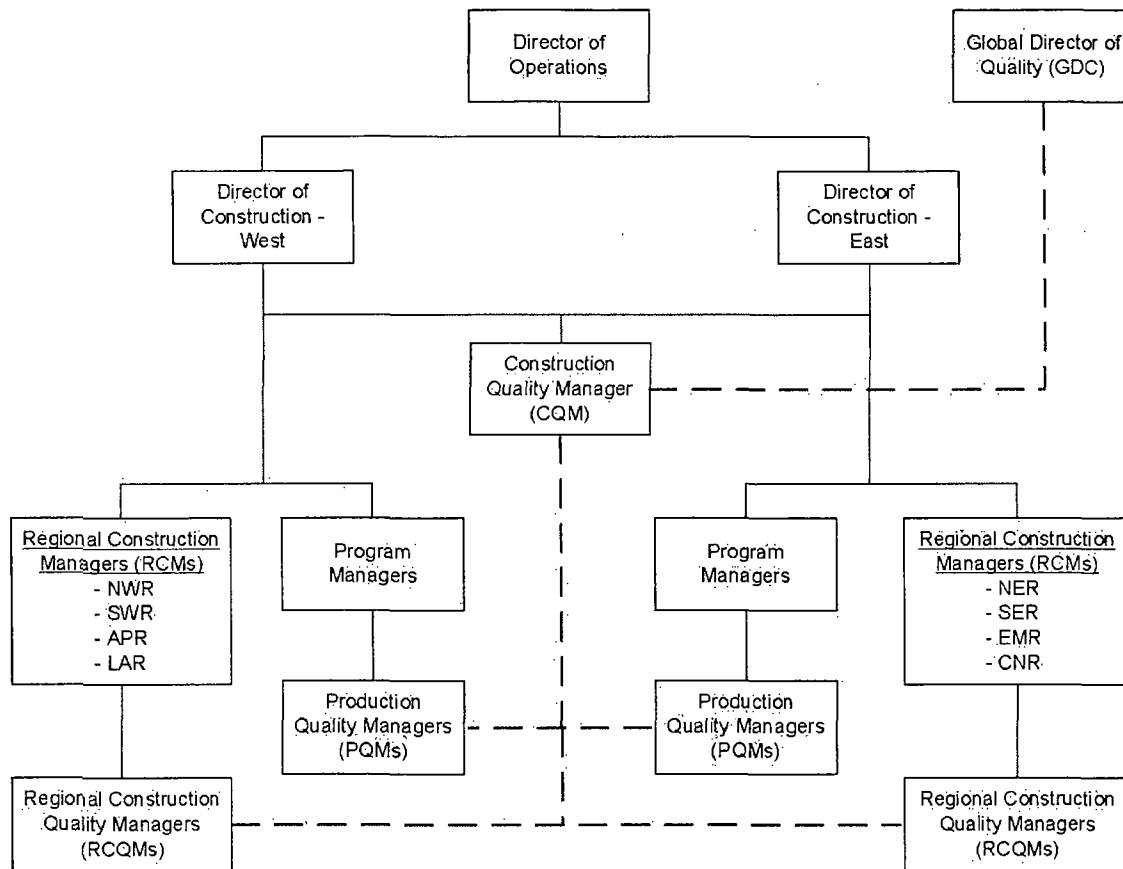
As shown on Figure C-1, Regional Construction Managers report directly to Directors of Construction who in turn report to the ESBG Operations Directors (North America and International). Both Directors report to the President of ESBG.

Figure C-1 shows the major regional functions reporting to the Directors of Construction. It also depicts the Construction Quality Manager reporting directly to the Director of Construction, while reporting on a matrix basis to the Global Director of Quality.

The following sections include the elements of a quality management program for a typical regional construction department. The concepts and processes included in Sections C.1 through C.4 are minimum requirements to be fulfilled by each of the ES regions under the direction of the RBGM, who is accountable for its development and implementation.

FIGURE C-1

Organizational Structure of ES Construction Management Organization



C.1 Applicability

This ES QMP section applies to all aspects of ESBG's Construction operations globally, including the following activities for construction work, regardless of the ESBG or CH2M HILL entity performing the work.

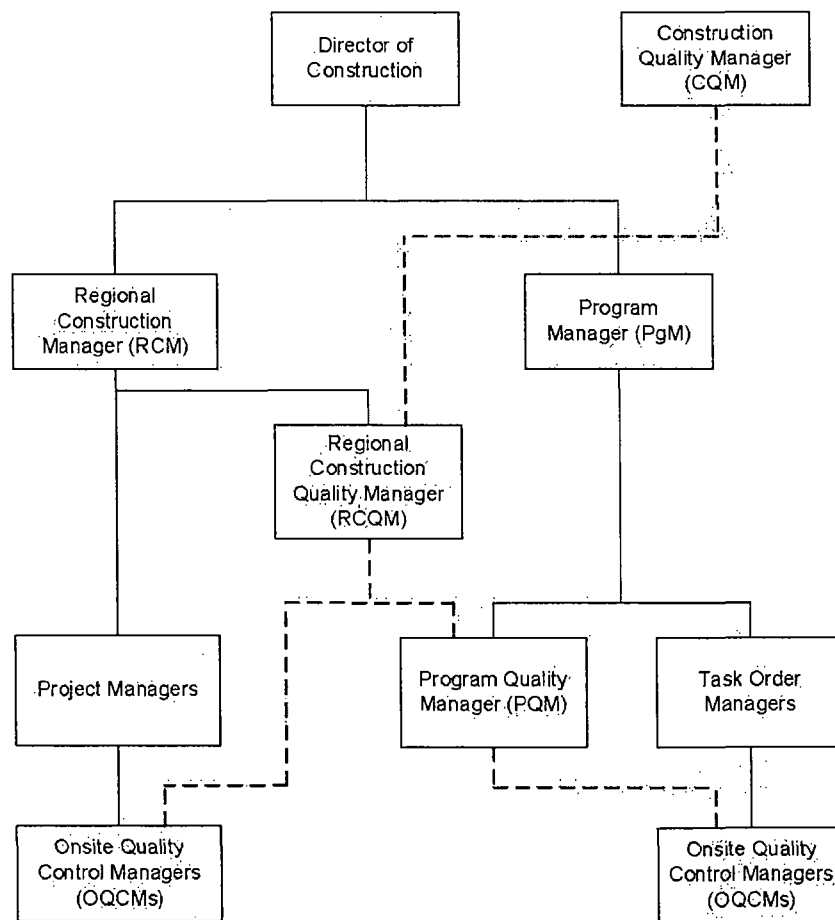
- Development of a technical scope of work during positioning and proposals
- Planning and scheduling of Construction projects
- Consulting-type work performed in conjunction with Construction projects
- Conceptual, Preliminary, and Final engineering design work, and related cost estimation associated with Construction projects
- All construction activities

C.2 Quality Management Structure

As stated in Section A.2, ESBG policy requires the development and implementation of a quality management structure in each region, to provide a mechanism for implementing this ES QMP. Construction quality management falls within the responsibility of the construction organization as outlined below.

Figure C-2 describes quality management functions at the regional and program levels. Two functional roles are deployed to lead and implement QM on a given project, program or task: Regional Quality Control Manager for general construction projects, and Program Quality Managers (PQM) who are assigned to programs. In certain programs and strategic account type contracts, these functions may have a different title in accordance with the client's own requirements or needs.

FIGURE C-2
Regional and Program-Level Quality Management Organization



In the cases where work is being performed in a region for a global (cross-regional) program, the PQM reports to the global Program Manager and indirectly to the GDQ with regard to quality management.

C.3 Key Construction Quality Management Roles and Responsibilities

The roles and responsibilities for the key quality management positions depicted in Figure C-1 are described below.

Director of Construction (DC)

The Director of Construction, who reports to the Director of Operations, directs and supports the Construction Quality Manager (CQM). They report significant quality problems to the ESG Global Director of Quality.

Construction Quality Manager (CQM)

The Construction Quality Manager (CQM) is responsible for developing, maintaining, and ensuring implementation of the Construction Quality Management Manual (CQMM) (Appendix C-2). This responsibility includes oversight of activities under the guidance of the quality program, performing periodic reviews and audits of the processes being implemented, evaluation of any recommendations made by the quality management teams regarding use of these processes, evaluating lessons-learned, and implementing continuous improvement initiatives. The CQM is also responsible for providing feedback on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the GDQ.

Regional Construction Manager (RCM)

This is a region-specific position, which reports to the Director of Construction, and is responsible for overall implementation of the quality program in their region. They assign and support the Regional Construction Quality Manager (RCQM). This responsibility includes working through the (RCQM) to ensure that all personnel are properly trained, as well as ensuring that qualified and experienced personnel are assigned in accordance with the needs of each project. The RCM is also responsible for monitoring and documenting the implementation of the quality program and capturing lessons-learned through project reviews.

Regional Construction Quality Manager (RCQM)

This is a region-specific position, which reports to the Construction Quality Manager and the Regional Construction Manager. The RCQM implements the ES QMP in accordance with the CQMM. The RCQM directs, monitors, and supports the selection and assignment of qualified Onsite Quality Control Managers (OQCMs) to projects and tasks managed in their respective region, and is also responsible for providing feedback on implementation of the ES QMP and recommendations for additions, changes, and enhancements of the plan to the Construction Quality Manager.

Program Quality Manager (PQM)

This is a program-specific function typically required by the client. The Construction Program Quality Manager (PQM) plans, implements, and updates the PQMP, and directs, monitors, and supports the selection and assignment of qualified Onsite Quality Control Manager (OQCM), in conjunction with the RCQM, to projects and tasks performed within their respective Program or Project. The PQM reports any nonconformance, noncompliance, and quality incidents to the RCQM or CQM, as directed.

Onsite Quality Control Manager (OQCM)

This is a project-specific function typically required where field measurements are of critical impact on achieving the overall project goals. The Onsite Quality Control Manager (OQCM) implements and documents quality management activities that are included in field plans. The OQCM reports any deviations or problems to the PM, RQM, and PQM (whenever applicable).

Construction Technical Manager (CTM)

This is a project-specific function typically required for projects with a relatively complex or multi-discipline technical scope of work, where planning, execution, and review needs require subject matter expertise. The Construction Technical Manager (CTM) helps the PM plan and implement all technical activities needed for the scheduling and delivery of construction projects and associated business development activities. The CTM also reviews and signs off on all critical deliverables and correspondences, as necessary.

Project Manager (PM)

The PM is responsible for overall implementation of the ES Quality Management Program on her/his projects. This responsibility includes working through the RCQM to ensure that all personnel are properly trained, as well as ensuring that qualified and experienced personnel are assigned to the project in accordance with the needs of each project. Most importantly, the PM is directly responsible for the assigning and supporting of both CTM and the OQCM.

Construction Manager (CM)

The CM is a project-specific onsite position reporting to the PM, which provides overall administrative and technical direction, enforces company and project policies, and manages daily client and subcontractor interfaces. The CM organizes and directs all construction-related activities on a construction project to ensure achieving established design specifications, budgets and schedule milestones, accounting requirements, and quality standards. The CM is also responsible for maintaining the official project log and onsite documentation files.

C.4 Quality Management Processes for Construction Projects

The Construction Quality Management Manual (CQMM) (Appendix C-2 for Table of Contents) describes the quality systems and processes that are to be implemented on construction projects. The quality systems and processes have been put into place in order to manage the risks and liabilities of the company, to ensure the quality and consistency of projects executed throughout the company, and to provide our clients with products and services that meet or exceed their expectations.

The purpose of the CQMM is to provide standards and guidance for construction services Quality Management Program implementation.

The following sections include key principles for the following processes; most of them are addressed in detail in the CQMM.

- Proposal Go/No Go (GNG) Process,
- Construction Project Contract Management Processes,

- Construction Project Delivery Processes,
- Construction Project Planning, Chartering, and Instructions,
- Preparation of a Construction Project Quality Management Plan, and
- The Construction Project Technical Review Process.

C.4.1 Construction Proposal Go / No Go (GNG) Process

The implementation of the QM process often begins at the capture or proposal stage. Setting the stage, including plans and resources for capture activities, is a Go/ No Go Process - which is substantially led by the BD organization.

Specific guidance relative to such process is included in the "ESBG Business Development Guidance Manual." The manual's table of contents is listed in Appendix A-2 of this Plan.

All construction Go/No Go decisions will follow the ES Business Group Bid and Contract Matrix for Construction and the EPC Risk Approval Matrices and guidance.

- A Project Pursuit Analysis (PPA) form or an Opportunity Risk Evaluation (ORE), when projects are > \$250,000 and for all at-risk projects, a Risk Opportunity Management (ORMT) form.
- RBGM, Regional Construction Manager, or their designee should approve and document a GO decision for any Regional proposal, and assigns a Proposal Manager who is qualified to lead the technical, operational, competitive, contractual, cost and pricing, and risk management aspects of the proposal.
- GBD and PM or the Global Director of Operations, is responsible for implementing all GNG briefing processes for Major and Global proposals, in accordance with the requirements of the ESBG Approval Matrix, and assign a Proposal Manager who is qualified to lead the technical, competitive, contractual, cost and pricing, and risk management aspects of the proposal.
- Any positioning, teaming, subcontracting or other pre-RFP activities performed in advance of a GNG decision, and which represents a commitment of the firm's name or resources, must be approved by an appropriate Regional or Global functional manager. Such manager would also, as needed, ensure the proper involvement of the RCM and Director of Construction, in the early positioning and proposal preparation stages.
- To obtain a GO decision to proceed with a proposal effort, a Go/ No Go Briefing must be prepared by the Proposal Manager and presented to regional or global management, as appropriate. A typical outline for such briefing, in the case of a Q2 or Q3 project, is shown below.

The Opportunity	Our Approach	Recommendations
<ul style="list-style-type: none"> • Background • Client and Positioning To-Date • Scope of Work and Deliverables • Project Schedule • Procurement Highlights <ul style="list-style-type: none"> – Budget, Revenue, and Profitability – Milestones and Schedule – Term and Conditions • Strategic Value 	<ul style="list-style-type: none"> • Key Strategies <ul style="list-style-type: none"> – Teaming and Alliances – Positioning – Project Leadership – Key Staff – Subcontracting – Pricing – Insurance • Resource Needs <ul style="list-style-type: none"> – Proposal Team – Proposal Schedule – Teaming and Subcontracting – Budgets 	<ul style="list-style-type: none"> • Technical/Operational/Management Risks and Their Mitigation • Delivery/Performance Risks and Their Mitigation • Health and Safety Risks and Their Mitigation • Environmental Risks and Their Mitigation • Contractual Risks and Their Mitigation • Political/Institutional Risks and Their Mitigation • PPA or ORE • Risk Opportunity Management Tool (ROMT)

C.4.2 Construction Project Contract Management Process

Contracts terms and conditions have great impact on CH2M HILL's ability to plan, secure funding and deliver projects successfully and in accordance with the highest technical standards our clients expect of us. Therefore, timely and, oftentimes, early engagements of the contracts function in the capture and procurement stages of the projects are important; these are discussed in more detail in Appendix A-3 ESBG Contracts Administration Guidance.

The following are key principles that are basic to typical ESBG construction contract review and administration processes.

- The Project Manager or Proposal Manager, depending on project phase, is responsible for ensuring the review of any and all contractual terms and conditions by a qualified KA.
- The Proposal Manager will ensure the ORE/ROMT, and other company required documents, are completed by the proposal team. The KA will audit to ensure the necessary documents are completed and approved prior to submission.
- The KA will ensure that the appropriate estimate review sign offs have been completed prior to submission of final proposal
- The KA will provide the proposal manager and project manager a proposal brief which summarizes all key contractual elements of the contract, including but not limited to notice requirements, payment terms and limitations, authorized representative, liquidated damages or penalties, schedule milestones, differing site conditions clauses, and any other special contract conditions of which the proposal and project should be aware.
- The Project Manager, in coordination with the KA, is responsible for ensuring that the Health, Safety, and Environmental performance of subcontractors is reviewed and approved by the Responsible Health and Safety Manager prior to entering into teaming agreements or contracts with subcontractors.
- The ESBG Director of Contracts is responsible for assigning a qualified KA to each proposal and contract negotiation effort. The KA reviews terms and conditions and

documents any which are considered severe or unusual for incorporation into the GNG process and proposal risk management planning and pricing.

- The KA is engage in all associated contract compliance activities associated with project execution and any and all, subcontracting activity, changes to the contract Scope of Work and contract terms and conditions.
- Project Delivery Manager (PDM) reviews contracts for large, complex and high-risk projects, particularly Master Service Agreements, Performance-Based, and Fixed-Price contracts. The PDM may also lead the negotiation of terms and conditions, with the proper support of the contracts, legal, and insurance functions.

The KA will facilitate federal pricing compliance, general contract compliance, bonding, and insurance.

C.4.3 Construction Project Delivery

The Project Delivery (PD) function shares responsibility for the initiation and support of the Quality Management process at all levels. The PD function is led by the Regional Project Delivery Manager (RPDM) to whom all PMs report. At the Global level, the PD function is lead by the Global Project Delivery Director (GPDD). Each multi-regional Program has a PDM who reports directly to the GPDD or her/his deputy. A detailed discussion of the project delivery function in ESBG is provided in Appendix A-4: ESBG Project Delivery Organization, Roles, Responsibilities, and Processes. The following paragraphs underscore some overarching concepts of project delivery throughout ESBG and at all levels.

- The RCM, the Director of Construction, or the appropriate Regional Project Delivery Manager (RPDM) is responsible for assigning a qualified Project Manager to each project within their respective purview.
- During positioning, capture, and proposal development stages, the RCM, the Director of Construction or their designees, as appropriate, must be consulted regarding any PM names assigned in a proposal, or otherwise conveyed to the client.
- The PM is responsible for implementing all requirements of the ESBG Project Delivery function, as outlined in the Project Delivery Manual.
- The construction project delivery quality elements encompass scope, schedule, budget, and health and safety.
- Delivery of construction projects requires the incorporation of functional team members to include, project controls, health and safety, estimating, quality control, contracting, procurement, and accounting.
- Project delivery quality management will incorporate monthly EAC, schedule, and Project Status Report updating and the incorporation of project reviews.

C.4.4 Project Planning, Instruction, and Chartering

The PM has total responsibility for planning and implementing all aspects of the project. At the outset of each project, the PM leads a team of technical staff (including the CTM) that will develop a Project QMP (PQMP) needed for executing the project technical/operational

scope of work in accordance with client expectations and requirements. A typical PQMP includes, but is not limited to, a statement of project objectives, scope of work tasks, field sampling and investigation plans, data quality objectives, chemical laboratory testing Quality Assurance Project Plan (QAPP), document control, material testing, construction specifications and drawings and Health & Safety Plan.

The PQMP, as well as other background and relevant documents (for example, proposal, client instructions, prime contract, subcontracts, project organization, roles and responsibilities, staffing plans, regulatory directives and decrees, permits, communication plans) are include in a "Project Instructions Document." Before commencing any project executions tasks, the PM plans and facilitates a "Chartering Meeting/ Operational Readiness Review (ORR)." The meeting is attended by key project staff and task leaders, as deemed appropriate by the PM and PQM, to ensure full understanding of project objectives, scope of work, work tasks, organizational roles and responsibilities, budgets, milestones, and deliverables. See related guidance in Appendix B-2 Project Planning, Instruction, and Chartering.

C.4.5 Project Quality Management Plans (PQMP)

Whenever construction work is performed a PQMP must be prepared for every construction project. The core requirements described in the ES CQMM must be implemented as appropriate to fit the specific scope of work and the applicable CQMM elements.

The PQMP should provide sufficient information to:

- Successfully deliver the project scope of work.
- Achieve client satisfaction.
- Ensure the quality of the work is in accordance with the project plans, specifications, and drawings.
- Meet CH2M HILL's technical, management, and safety standards.

Appendix B-3 includes detailed guidance and templates for the preparation of a PQMP. The following paragraphs, however, provide key highlights of such guidance.

The size and complexity of the PQMP depend on the scope of the work, complexity of the project tasks, risk management considerations, quality management level, client requirements and expectations, as well as CH2M HILL's own technical, management, and safety standards and expectations. A description of what should be included in the PQMP is described in the CQMM. At a minimum, a PQMP should include a summary of the project work plan, a table of deliverables, milestones and schedule, and the list of quality activities, as well as a list of the key staff.

The PM, RQCM and OQCM are responsible for developing and maintaining a valid and up-to-date PQMP. During project execution stages, the PQMP is considered a dynamic tool that continues to reflect any changes of the scope of work, technical procedures, milestones, deliverables, and/or schedule. During the project execution stages, the CTM, in close cooperation with the PM, plans and supports the execution of the technical scope of work

(SOW) in accordance with the PQMP, and communicates, as appropriate, to ensure the efficient implementation of the QM Review process.

C.4.6 Construction Project Quality Management

The CQMM applies to all construction tasks performed by the ESBG, including, but not limited to, the following types of projects: federal, at-risk, commercial, industrial, tasks under consulting contracts, emergency response, design-build, design-bid-build, clean construction, environmental remediation, construction of remediation systems as well as decontamination and demolition.

The construction quality program may be tailored and scaled to the size, complexity, and risks of the project. However, the core standards highlighted in the CQMM must be implemented. The construction quality management process must begin at the proposal stage of the project and executed throughout to closure of the project.

For projects that are under specific contract requirements, the CQMM standards, at a minimum, must be met. If the contract requirements are more stringent than the CQMM standards, then those contract requirements must be met. The quality standards for each new program must be defined with the cooperation and guidance of the Construction Quality Manager.

The PM is ultimately responsible and accountable for the implementation of the approved PQMP on their project. The PM, in conjunction with the RCQM and the PQM, if applicable, is responsible for providing adequate quality management resources and budget for the project. The CM maintains the daily oversight of the quality plan at the project level.

C.4.7 Construction Project Technical Review Process

Periodic audits of projects are required to ensure meeting client and project objectives, ensure compliance with the PQMP, and mitigate administrative/operational/technical and other project risks. These reviews are typically conducted separately from those completed by the project delivery organization, which are typically focused on cost and schedule status. The frequency of technical audits will be jointly determined by the RCM, PDM, CQM and RQCM. Audits will address the following aspects, as appropriate.

- Performing onsite inspections and surveillance to ensure that work is performed in accordance with the project plans, specifications, and drawings
- Ensuring environmental and material tests are performed in accordance with the project plans, specifications, and drawings.
- Inspecting project files and records to assure document control is implemented.
- Review of submittals and deliverables, as necessary
- Ensuring completion inspections are performed and that nonconforming items on punch lists are corrected and completed
- Preparation or review of project records to ensure that they are complete and fully document project activities and events

- Audits and surveillance of subcontractors' quality systems
- Coordinating with and assisting quality managers in the performance of quality audits, inspections, and surveillances

D. Munitions Response

D.1 Applicability

This section applies to all aspects of ESBG's munitions response (MR) operations globally, including the following activities:

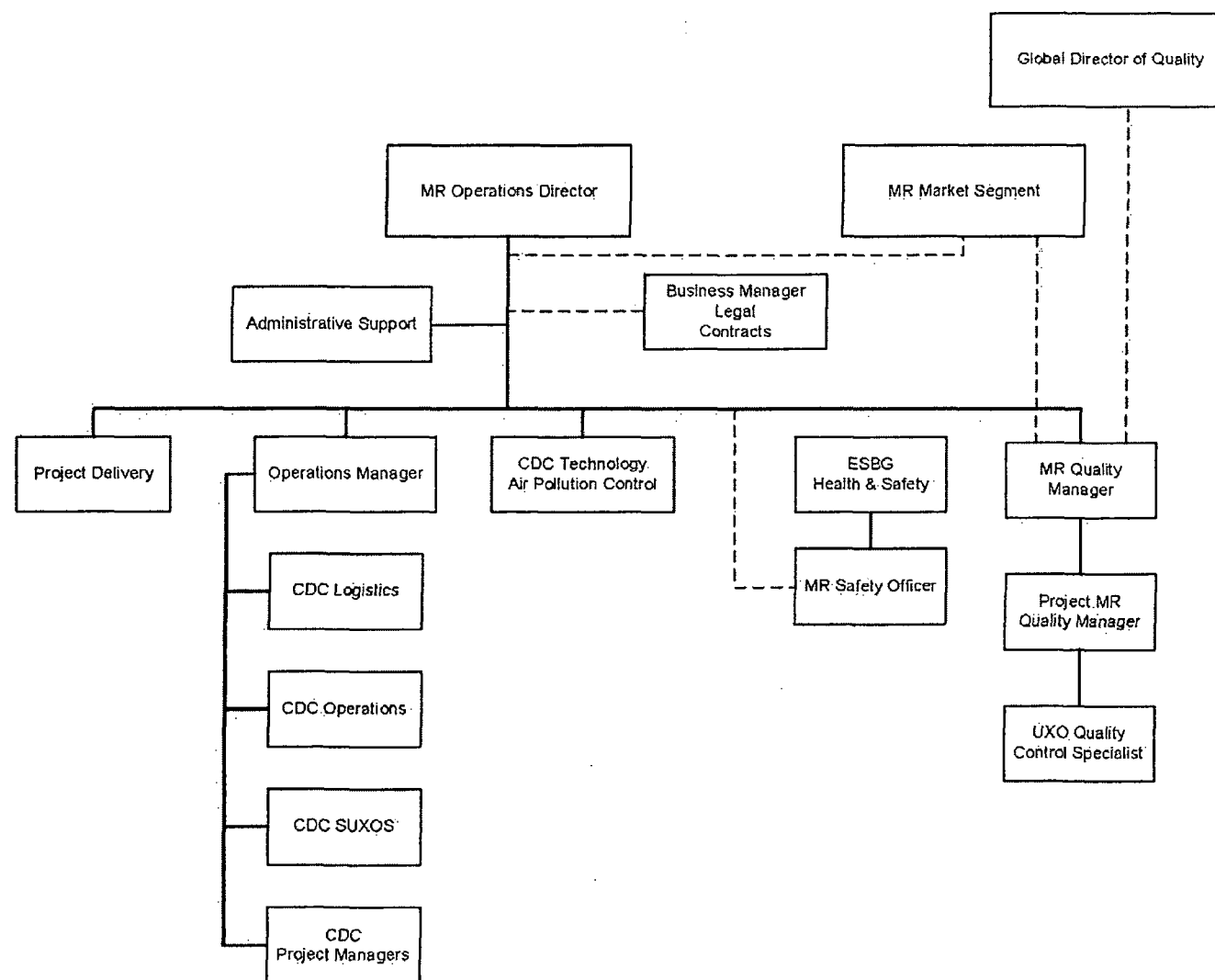
- Development of technical scope of work during positioning and proposals
- Development of work/health & safety plans to ensure compliance with the contract scope of work and applicable regulations
- Planning and scheduling of munitions response projects and tasks, which include both munitions and explosives of concern (MEC) projects and controlled detonation chamber (CDC) projects and tasks.
- Performing field investigation activities for MEC projects, including reconnaissance; establishment of project boundaries; vegetation reduction; surface removal of MEC and related items; digital geophysical mapping (DGM) surveys; reacquisition of anomalies; excavation/investigation of anomalies; identification/disposition of MEC and MEC related scrap.
- Providing MEC Support in the form of MEC Avoidance, MEC Construction Support (Both On-Call and Onsite), and MEC Removal.
- CDC operations and support for disposal of conventional munitions, chemical warfare material, and other energetic materials.
- Explosives Usage

D.2 MR Project Quality Management Structure

Munitions Response services are delivered to clients by six key personnel categories: Project Managers, Senior Unexploded Ordnance (UXO) Supervisors, UXO Safety Officers, UXO Quality Control Specialists, Geophysicist, and Geographic Information Systems (GIS) Managers who reside in the Munitions Response Operations business unit.

Figure D-1 shows the organizational structure of ESBG's munitions response unit. A more detailed discussion of this organizational structure is included in Appendix D-1.

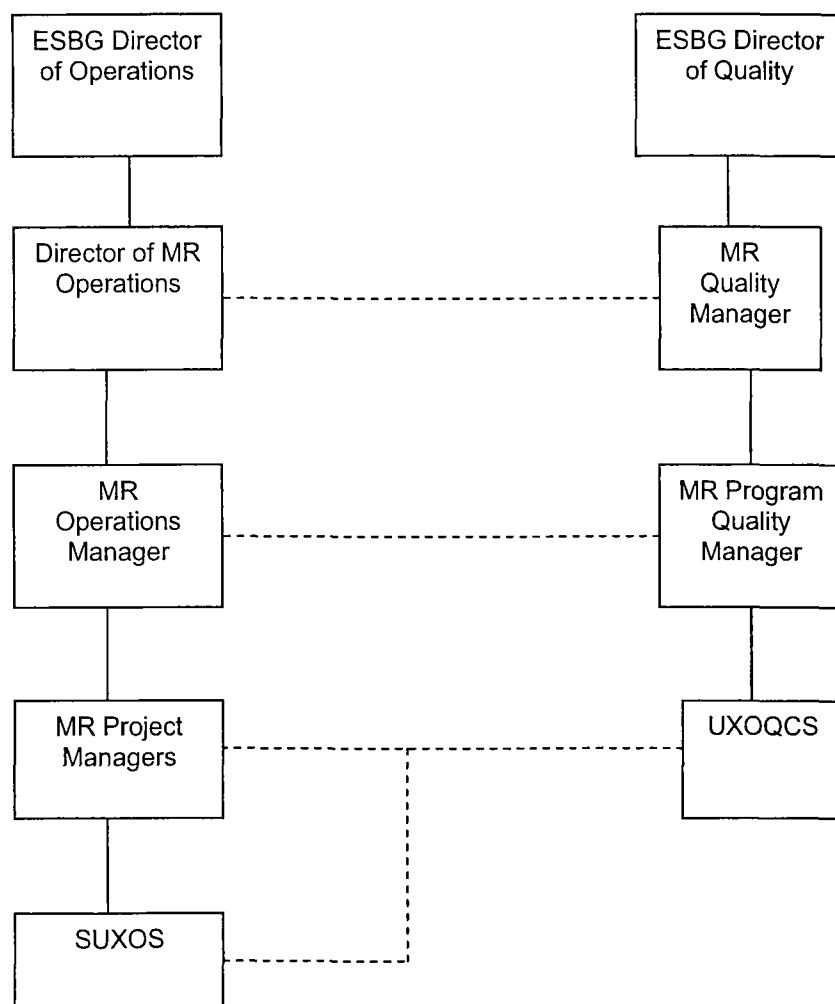
FIGURE D-1
Organization of Munitions Response Operations



D.3 Key MR Project Quality Management Roles and Responsibilities

Figure D-2 shows the structure of the MR quality management organization. Three functional roles, discussed below, are specifically deployed to implement ES QMP – MR Quality Manager (MRQM), Program MR Quality Managers (PMRQMs), and Unexploded Ordnance Quality Control Specialist (UXOQCS). In certain programs or international work any of these three functions may have a different title in accordance with client's own requirements or needs.

FIGURE D-2
Structure of Munitions Response Quality Management Organization



- **MR Quality Manager (MRQM).** The MRQM has direct access to management at a level where appropriate action can be effected and reports to ESBG Global Director of Quality. The MRQM has the responsibility for developing, implementing, and maintaining the ESBG QMP for all MR operations, including the following:
 - Identify quality problems and initiate, recommend and/or provide corrective measures to those problems.
 - Verify implementation of corrective measures.
 - Halt or stop work as necessary due to address quality issues.
 - Sign Certificates of Compliance/conformance as required.
 - Approve all Work Plans for MR projects and task orders.
 - Conduct senior level review of contract deliverables
 - Oversee the implementation of Health & Safety Plans as well as any required changes or exceptions thereto.
- **Program MR Quality Manager (PMQM).** The Program MRQM provides senior level quality management support to MR projects, both when included in an MR program or to MR Operations for projects that are not part of an MR program. The PMQM is responsible for ensuring that the QMP is implemented for MR projects or task orders, which include the following duties:
 - Assess the effectiveness of, maintaining and approving the Program QMP and reporting the status and effectiveness to Munitions Response Group (MRG) senior management.
 - Conduct senior level review of contract deliverables
 - Recommend approval for all Work Plans and other Quality related procedures within the company.
 - Monitor activities at individual work sites and coordinating with Project Managers, Site Safety and Health Officers and UXO Quality Control Specialist (UXOQCS).
 - Develop all QMP procedures.
 - Approve all changes or deviations from established procedures or techniques.
 - Maintain all quality records, work plans or other documents.
 - Provide training, certification and evaluation of continued satisfactory performance of QMP/QC personnel.
 - Evaluate the quality of work performed by MRG. Conduct audits, surveillance, inspections and other tests to ensure compliance with applicable activities of the QA Program.

- **UXO Quality Control Specialist (UXOQCS).** The project UXO Quality Control Specialist is responsible for the following:
 - Assess the effectiveness of, maintaining and approving the PQMP and reporting the status and effectiveness to the Program Quality Manager (for programs) or the MR Quality Manager for projects outside of programs.
 - Achieve quality that meets project and program goals, satisfies the client, and engages employees and clients.
 - Provide assistance in development of a QAPP that describes the program QM system – organization roles, responsibilities, and other applicable procedures, and defines the quality approach for the project.
 - Plan work to incorporate the requirements of the QC Plan.
 - Provide training (initial and refresher) and development of assigned personnel.
 - Implement the MR QC Plan.
 - Monitor activities on the project and coordinating with the Project Manager and the UXO Safety Officer (UXOSO).
 - Maintain all quality records, work plans or other documents.
 - Evaluate the quality of work performed by the project team. Conduct audits, surveillance, inspections and other tests to ensure compliance with applicable activities of the QA Program.
 - Other duties as described in the MRG QMP and Project QC Plan.
- **Project Manager** is responsible for overall implementation of the ES Quality Management Program on their projects. They work with the PMQM and UXOQCS. This responsibility includes working through the PMQM to ensure that all personnel are trained on the quality program, as well as ensuring that qualified and experienced personnel are assigned to the project in accordance with the needs of the project.

D.4 MR Project Quality Management Processes

The project quality management process is an integral part of planning and delivering any MR project or activity in ESBG. Accordingly, it is a primary responsibility of the Project Delivery function, and is a key task to be implemented and supported by Project and Task Managers, in collaboration with the MRQM. The key components of such process are:

- MR Quality Management Plan
- MR Project Risk Management & QM Level Assignment
- MR Project Quality Standards
- MR Proposal Go / No Go Process
- MR Contract Management Process
- MR Project Delivery Process, and
- MR Project Review Process

A brief discussion for each component is included in the following paragraphs; a more detailed discussion of each is included in corresponding appendices to this QMP.

D.4.1 MR Project Quality Management Plan (PQMP)

Each MR project or task order in ESBG must have a Project Quality Management Plan which provides sufficient information to:

- Successfully deliver the project scope of work,
- Achieve client objectives and satisfaction, and
- Meet CH2M HILL's technical, operational, quality and safety standards.

A PQMP could be as long as few pages, e.g. for conventional and relatively small MR assignments, or as extensive as several volumes (e.g. for large remedial investigation/feasibility studies or removal projects). The size and complexity of the PQMP depends on the scope of work, complexity and duration of field investigation tasks, risk management considerations, quality management level, client requirements and expectations, as well as CH2M HILL's own technical, management and safety standards and expectations. At a minimum, A PQMP should include a summary of the project work plan, a table of deliverables, milestones and schedule, as well as a list of the key staff.

A detailed discussion of the specific goals and objectives of a MR PQMP, along with typical outlines and templates, are included in Appendix D-2.

D.4.2 MR Project Risk Management & Quality Management Levels Assignment

Planning and managing for the special risks involved in MR projects is a key component of the successful delivery of such projects while maintaining our client satisfaction. To achieve such goal in a cost-effective fashion, a PQMP must be tailored to the specific risks and hazards at the project site(s), as well as the types and condition of munitions involved. Accordingly, an assignment of a Quality Management Level is made by the PM and the MRQM at the outset of each project, which governs the QM requirements to be implemented.

The three Quality Management Levels (QMLs) used for ESBG MEC projects, are as follows:

- **QML-1** is the basic level with the least requirements. It includes relatively small projects that focus on MEC Avoidance procedures.
- **QML-2** is where the scope of work is sufficiently large or complex where a specially qualified STC, who is an expert in the subject matter, must be jointly assigned by the MRG. This category typically includes projects that involve MEC Construction Support. For such projects, the PQMP is more than several pages, and would typically include several appendices to support the scope of work. The PQMP should be reviewed and approved by the MRQM.
- **QML-3** is when- due to certain risk considerations or other objectives- the client, ESBG Regional or ESBG Global Management request an added level of quality control for technical services and deliverables focused on removal and disposal of MEC. In this

case, the MRQM is assigned as an independent reviewer of the technical work, and reports directly to either the ESBG Global QM or their designees, as appropriate.

The three QMLs used for ESBG CDC projects are as follows:

- **QML-1** is the basic level with the least requirements. It includes relatively small projects that focus on disposal of conventional munitions.
- **QML-2** is where the scope of work is sufficiently large or complex where a specially qualified STC, who is an expert in the subject matter, must be jointly assigned by the MRG. This category typically includes projects that involve disposal of commercial energetics. For such projects, the PQMP is more than several pages, and would typically include several appendices to support the scope of work. The PQMP should be reviewed and approved by the MRQM.
- **QML-3** is when- due to certain risk considerations or other objectives- the client, ESBG Regional or ESBG Global Management request an added level of quality control for technical services and deliverables focused on disposal of CWM. In this case, the MRQM is assigned as an independent reviewer of the technical work, and reports directly to either the ESBG Global QM or their designees, as appropriate.

The determination of a QML begins at the capture stage with the execution of an operational risk evaluation (ORE) to capture costs and identify hazards associated with the MR activity. The ORE is a living document that must be updated any time changes are identified that affect cost or change the hazard assessment.

Details of the ORE process are included in Appendix D-3. During proposal development, the MRQM is responsible for articulating technical scope of work requirements and associated quality management objectives and activities, based on input from client, CSM, and RFP or like documents which typically include client needs and expectations. Ultimately, the PM is accountable for the implementation of the ES QMP on their project, which must be based on a confirmed QML.

D.4.3 MR Project Quality Management Standards

In the normal conduct of ESBG's MR projects, different types of standard guidance and procedures are used to ensure work consistency, quality and efficiency. These include the following types:

- ESBG Standard MR Operating Procedures & Requirements
- Health, Safety, Environment and Quality (HSE&Q) 610 Explosives Usage and Munitions Response
- Department of Defense Explosives Safety Board (DDESB) Standards
- U.S. Army Corps of Engineers Requirements (Engineer Regulations, Engineer Manuals, Engineer Pamphlets, and Interim Guidance Documents for MR)
- Other Department of Defense Service Component Documents for Explosives Safety
- Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) Regulations

- Other Regulatory Requirements, as applicable.
- Client SOPs and Requirements, whenever applicable.

These are incorporated and discussed in more detail in Appendix D-1 through Appendix D-7 of this plan.

D.4.4 MR Proposal Go / No Go Process

The go/no go decision process provides an evaluation of potential return on investment and potential for success. The MR Market Segment Director and MR Operations Director are the first level screening for MR proposal efforts. The go/no go brief is usually prepared by the CSM or BD manager in power point format and contains many of the basic elements of the capture plan. Information that should be included in the go/no go briefing for decision makers is listed below.

The Opportunity	Our Approach	Risk Management & Recommendations
<ul style="list-style-type: none"> • Background (client, etc.) • Scope of Work and Deliverables <ul style="list-style-type: none"> – Geographic coverage – Type of MR activities – Potential customers • Strategic Value • Procurement Information <ul style="list-style-type: none"> – Procuring Agency – Pre-Proposal Conference – Type of Procurement – Type of Contract – Number of full and open and set-aside awards – Contract Terms and Conditions – Evaluation Factors – Decision Makers • Financial <ul style="list-style-type: none"> – Program budget and contract value(s)) – Revenue, and Profitability • Project Schedule <ul style="list-style-type: none"> – RFP Release – Proposal Due – Award – Delivery 	<ul style="list-style-type: none"> • Competition <ul style="list-style-type: none"> – Likely competitors (size, SB status) – Strengths and weaknesses • CH2M HILL Position <ul style="list-style-type: none"> – Past proposal and/or working relationship – Positioning To-Date – Strengths/weaknesses relative to SOW • Key Strategies <ul style="list-style-type: none"> – Positioning before release of RFP – Teaming, subcontracting, and Alliances – Project Leadership – Key Staff – Discriminators – Pricing – Insurance • Resource Needs <ul style="list-style-type: none"> – Proposal Team – Proposal Schedule – Teaming and Subcontracting – Budgets (positioning, proposal, interview, negotiations) 	<ul style="list-style-type: none"> • Technical/Operational/Management Risks and Their Mitigation <ul style="list-style-type: none"> – High Risk Scope Elements – Health and Safety Risks – Environmental and Explosives Risks • Delivery/Performance Risks and Their Mitigation <ul style="list-style-type: none"> – Contractual Risks – Financial Risks • Political/Institutional Risks and Their Mitigation • ORE

Selection of Teaming Partners/Subcontractors

Selection of teaming partners and subcontractors is an important part of the proposal process. Teaming partners should be identified in advance of the expected release of the solicitation and asked to join the team only if they provide an advantage and have a defined role to play in execution of the project. Teaming partners should only be added for well

defined reasons such as to fill a specific need, satisfy a geographic requirement, or meet other contractual requirements and then only when it will enhance the chances of winning.

The proposal Capture Director in concert with the MR Market Segment Director is responsible for providing quality management for the selection of teaming partners and subcontractors and for overseeing the steps that lead to a formal teaming agreement. Detailed steps for that lead to a formal teaming agreement are provided in Appendix D5.

Review of Teaming Agreements

Review of Teaming Agreement must be approved by the MR Market Segment Director and the proposed Program Manager prior to signature by the Director of MR Operations.

D.4.5 MR Project Contract Management Process

Subcontract Agreements

Subcontract agreements must be reviewed and approved by a contracting officer to ensure that any contractual terms and conditions are acceptable.

Review of Cost Submissions

Cost submissions must be reviewed by the Munitions Response Project Delivery Manager and any other regional managers responsible for project delivery of the proposed costs.

D.4.6 MR Project Delivery Process

The MR QMP, together with implementing MRG MR Quality Control Procedures, form an integrated management control system for conducting activities safely and protecting the environment, public health and our employees. The significant features of MRG's QMP are:

- Quality verification and overview activities that demonstrate the completeness and appropriateness of achieved quality
- Assurance that an activity is performed to specified requirements
- Assurance that an item or project will perform its intended action

The achievement of quality is accomplished by ensuring that management at all levels is responsible and personally accountable for achieving quality. All personnel are responsible for performing quality work.

Types of MR Projects

The following are types of MR projects: MEC Avoidance; MEC Construction Support; MEC Removal; CDC disposal of conventional munitions; CDC disposal of commercial energetics; and CDC disposal of CWM

Each type of MR project is organized the same with a project manager reporting to MR operations and a UXOQCS reporting independently of MR Operations to the MRQM or to a MRPQM if the task order is a part of a program.

While these projects vary with the level of QM required, each will have the following basic processes: planning; scheduling; staffing; development of an explosives safety submission,

explosives siting plan, and work plan that addresses the specifics of the project; training of personnel; and reporting. Details of processes and tasks for execution of MEC and CDC projects are included in Appendix D-6.

Application of MR Project Delivery

MRG QMP requirements and procedural controls will be selectively applied. The requirements selected, and the degree of their application to each item and activity, will be commensurate with the following factors as applicable:

- Consequence of failure
- Complexity of design or fabrication/installation uniqueness
- Reliability of system/process
- Degree of functional product demonstration
- Degree of standardization
- History of quality
- Impact on cost or schedule in the event of failure
- Need for special controls or processes
- Safety class designation

The responsible design and operations organizations will describe in appropriate design documents (drawings, specifications, operating procedures, work plans, etc.) the quality requirements and procedural controls. This should be accomplished by establishing quality levels for project items or activities. The quality levels will consider the relative degree of environmental, safety, programmatic, or economic impact and risk that could result should an item, activity, service or operation fail to meet the specified quality requirements, or should actual failure occur.

The MRG Operations Manager in concert with the GMRQM is responsible for assigning QM personnel to project delivery teams.

Program Administration

The MRG Quality Manager is responsible for defining the Quality Management Program requirements. The MRG Quality Manager is responsible for:

- Monitoring the effective implementation of the MRG Quality Management Program
- Identifying the need for developing and implementing new or revised quality policies
- Providing interpretation of Quality Management policies
- Providing final resolution of disputes when necessary
- Reviewing and approving changes to this Quality Manual and those quality management subject procedures used for MR related activities

The senior managers, typically Project Managers, for each project are responsible for implementing the Quality Management Program requirements on the work that their Project Team performs.

Qualification Requirements

Project specific implementing procedures shall consist of the following:

- QM during procurement activities
- QM during planning, delivery and close-out
- QM of the technical work and products
- QM during post-closeout disputes or legal actions

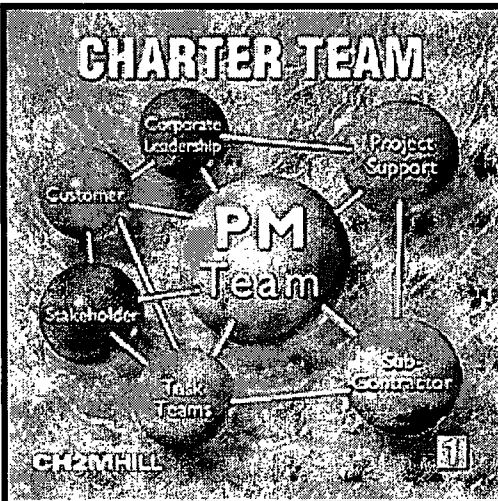
D.4.7 Project Review Process

Periodic reviews of projects are required to ensure meeting client and project objectives, assure compliance with the PQMP and mitigate technical and other project risks. The frequency of such reviews will be jointly determined by the PM and MR QM.

Specific requirements and guidance related to implementing MR project reviews are included in Appendix D-7.

Appendix B

Charter Implementation Guidelines



Chartering Definitions
Chartering Process Checklist
Chartering Planner
Charter Elements by Project Type
Sample Charter Agendas
Conducting Charter Sessions Guidelines
Sample Charter Documents
Charter Endorsement Guidelines

CH2MHILL

Charter Implementation Guidelines

Introduction

After the project charter has been endorsed by the attendees of the chartering session and other determined project participants, the charter should then be communicated and distributed to others that are associated with the project. Once the project charter has been communicated and distributed appropriately, it should be continually used through the life of the project; in the planning phase until the close-out of the project. Occasionally, changes occur in the project which warrant changes to the original charter, sometimes referred to as re-chartering.

Directions for Use of this Tool

This tool is organized into four main sections described by the questions below. Click on the question to go directly to that section or scroll through the sections to read the entire document. To return to this menu of questions, press "Return to Main Menu" at the end of any of the sections.

Main Menu: Implementation Questions	
1)	<u>Who does the Charter need to be communicated and distributed to?</u>
2)	<u>What are Some Different Ways to Communicate and Distribute the Project Charter?</u>
3)	<u>How Should the Project Charter be used throughout the life of the Project?</u>
4)	<u>What if the Charter needs to be changed during the project?</u>

Who does the Charter need to be communicated and distributed to?

Once the project charter has been endorsed by all the project participants that were determined necessary, the project charter should be communicated and distributed to all appropriate parties. A final copy of the charter document including a signature page (if one was created) should be distributed to the project participants who had been asked to endorse the charter. Other entities, who were not originally asked to endorse the charter, may benefit from awareness of the charter, even if their endorsement was not required.

The communication of the project charter helps to ensure clarity of focus and a sound working relationship for the project. Listed below are some of the other entities who should be considered who

may benefit from an awareness of the charter and will thus be better prepared to act supportively when properly informed.

- Personnel from project support organizations who are providing direct support to the project but are not "key personnel" on the project team
- Personnel from other functional groups that may have occasional contact with the project
- Personnel from other projects that have interdependence with the project
- Personnel that may be affected by the results of the project
- Management representatives in organization who were not asked to endorse the charter. These may include any manager who is providing resources to the project
- Customers of the project if they did not participate in the chartering session
- Key External Stakeholders if they did not participate in the chartering session

This is a complete list to consider but rarely would it be necessary to communicate and distribute the project charter to all of these entities.

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What are Some Different Ways to Communicate and Distribute the Project Charter?

There are several ways to communicate and distribute the project charter to the other entities listed above. In the most extensive manner, the entire charter document is shared with these other entities. For most projects, the sharing of the entire chartering document is not necessary, especially if it is a fairly lengthy document. In this instance, the most appropriate sections of the charter that relate to an understanding of the team's purpose and their role in helping to achieve that purpose can be created as an executive summary, and distributed. One or two pages carefully crafted are typically sufficient for this effort. Often this summary is directly transmitted to the defined entities with some brief wording describing the project and the purpose for communicating this to them. Remember that for these entities, awareness and understanding is being sought, not necessarily endorsement.

Another technique to communicate the project charter that is occasionally used is to have a brief review meeting where the charter is presented to the participants in the meeting and some time is allowed for questions and answers. Generally, edits to the document, as a result of this meeting, should not be encouraged; keeping in mind that at this point the charter has been endorsed by project participants that were deemed appropriate. This meeting can focus on internal or external personnel. For example, the meeting could have several representatives from the different internal project support organizations or it could be with representatives from various external stakeholder groups.

Using the organization's intranet or internet capabilities can also be an effective means for communicating and distributing the charter. If there is a capability that exists for either a project-specific site or a general project area on an internal web-site, post the project charter there for others to access. Generally, it is good to provide an executive summary version of the charter on these sites and indicate that a detailed version exists, which can be obtained by contacting the project manager. Even if this is used as the communication and distribution technique, it is still good to notify certain personnel to ensure that they review the charter. Let them know it exists on the site and how they can access the information. Occasionally, for a project that has high public visibility or has various key project team members outside your organization, the charter is placed on a project-specific external internet site. If this is done, pay close attention to the wording in the executive summary version of the charter, keeping in mind that some who read this might not be familiar with the chartering process.

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How Should the Project Charter be Used throughout the Life of the Project?

The project charter should be used as a management tool, which serves as a “compass” for the project team throughout the life of the project. Many times a Project Charter is not used effectively after it is created; it is not looked at again during the project. This is misuse of a valuable tool, which can help with a successful project. A project manager should find different ways to keep the charter visible and focused on during the life of the project. Listed below are some different situations/ ways that the project charter document can be used and kept visible during the implementation of the project.

- At regular **project review** meetings, frequently review the project charter to ensure that the project is maintaining the previously defined focus and that the “hows” of the project such as the detailed roles and responsibilities and the operating guidelines are being implemented in accordance with their original intent.
- At any point in the project where there is an objective to **self assess the effectiveness** of the project team, use the project charter as the starting point or benchmark for which a comparison is made.
- Use the project charter to help **maintain the focus** of the project, especially if it has been determined that some of the chartering elements need to be reinforced. Review the charter with the appropriate project participants to bring attention to what everyone has agreed to before the project began its implementation.
- When **questions are raised by management** regarding the performance of the project, use the charter to reinforce some of the previous decisions or directions of the project.
- If **new project participants** join the project such as new project team members, new management in the organization, or new customer or stakeholder representatives, then review the project charter with them as one of the means to familiarize them with the project.
- If an interested entity who is not a direct project participant asks for an **update or some information** regarding the project, use some of the contents of the chartering document to fulfill this request.
- When **creating project documentation** of various kinds, use excerpts from the project charter in the documentation or attach the project charter to the documentation if it is particularly relevant.
For example:
 - If a measurement report for the project is being created include the project purpose statement and the critical success factors at the top of the page.
 - Attach the project charter to agendas for project meetings.
 - Reference the project charter in other project documentation when documenting a key decision that was reached and mention how it is consistent with the previously defined project charter and in what way.
- When **closing out a project**, as part of the Project Performance Assessment, evaluate the effectiveness of the Chartering Document in terms of how the original definition compared to how the project actually operated.
- If a **major change is required** in the project and different alternatives are being considered, evaluate the impact of these alternatives on the project charter. Is the change consistent with the charter, and if not, does the charter need to be changed? Note that if it is determined that the project change will require a change in the project charter, see the section on the next page.

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What if the Charter needs to be changed during the project?

In general, the Project Charter is a document that should not be frequently changed or edited during the project. Once it has been established, try to keep it as stationary as possible to improve its effectiveness. If there are frequent changes to a project charter, it usually indicates that the initial work was not thoroughly agreed to, there was an insufficient level of detail defined, or that the project has some significant interpersonal problems.

When to consider re-chartering the project

Changes to the charter (re-chartering) should be considered when:

- There is a significant change in the project. Significant changes in personnel or scope often tend to greatly affect the original charter, and in these cases, re-chartering should be considered.
- There are significant problems developing between the personnel on the project team. Sometimes taking a step back and re-chartering, paying particular attention to redefining or refocusing the charter elements, can bring clarity and sense of direction to the project. For this situation, there may be some specific problem solving or conflict resolution that needs to be addressed.
- The project is a long-term project and re-chartering may be used to provide a useful refresher at specific intervals in the project (e.g., annually).

Guidelines for Planning and Conducting a Re-Chartering session:

Use the same steps to plan the re-chartering session as the initial chartering session. (Note: See the Chartering Planner and Chartering Process Checklist for additional reminders). One of the items mentioned in planning a chartering session was to talk with some of the participants of the session prior to the meeting to get input for the agenda and to define some of the issues. This is particularly important to do for a re-chartering session because the agenda might not take on an element by element form similar to the initial chartering session. There are two fundamental differences between a re-chartering session and an initial chartering session.

- 1) When conducting the re-chartering session, the chartering elements that are reworked will not be done from scratch. They have already been developed at the start of the project, so existing information will be edited or modified to accommodate the changes that have been made to the project.

Exceptions to this may be when it is determined that a new chartering element needs to be worked. For example, in a re-chartering session it may be good to define some responsibilities of specific personnel of functional departments that were not previously addressed in the initial session. If there are interpersonal problems between personnel, it would be good to define interpersonal behavioral expectations if that had not been previously done. Defining some operating guidelines for areas that had not been addressed in the previous chartering session can also be effective.

- 2) The other fundamental difference is that in a re-chartering session, the project now has some history. Thus, some issues and problems have developed either technically, organizationally, or interpersonally. Thus, in a re-chartering session, there is often a need to address specific problems that have developed. So thus portions of the meeting may take on more of a problem-solving mode than a pure chartering mode. Use any number of problem-solving processes to develop solutions for these problems. (For example, 1. Clearly identify the problem, 2. Analyze the Problem, 3. Discuss Alternative Solutions, and 4. Agree upon solution and implementation plan.)

Arrowhead Contracting, Inc.
Qualifications



April 23, 2007

Pat Viccaro
Subcontract Administrator
CH2M Hill
99 Cherry Hill Road, Suite 200
Parsippany, NJ 07054

Honeywell Celotex Site, Chicago, IL

Dear Ms. Viccaro:

On behalf of Arrowhead Contracting, Inc, I am pleased to provide you Arrowhead's company experience so that we may be considered for the remedial activities at the Honeywell Celotex Site in Chicago, Illinois.

If you have any questions or need additional information feel free to give me a call at 913-814-9994.

Sincerely,

A handwritten signature in black ink, appearing to read "Greg Wallace". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Mr. Greg Wallace, RG
Vice President of Environmental Operations

Company Experience

Arrowhead is a Native American-owned Small Disadvantaged Business headquartered in Overland Park, Kansas. Established in 1990, we are in our 17th year of continuous growth and diversification. Arrowhead's services encompass two primary platforms of business which include General & Civil Construction, and Remedial Construction & Engineering. Over 95% of Arrowhead's annual revenues (\$27M, 2006) are the result of Federal prime contracts and/or subcontract positions with large business government prime contractors.

In addition to our corporate headquarters in Kansas City, Arrowhead maintains two field offices located in St. Roberts, Missouri, and Des Moines, Iowa. Arrowhead offers a diversified professional and craft labor work force of 84 individuals and extensive experience utilizing direct hire practices and/or assenting to local labor agreements. The Company also maintains DCAA-audited accounting systems, providing the ability to perform both firm-fixed price or cost reimbursable federal contracts.

Arrowhead has the necessary resources to execute projects ranging from straightforward, short-duration engineering and construction efforts to large, complex, multi-year projects that include remedial actions, facility demolition, field engineering, general construction and transportation & disposal services. Our multidisciplinary personnel include engineers, scientists, and construction professionals, supported by experts in industrial hygiene, construction safety, quality control, health physics, and contract management. We offer a modern fleet of construction equipment and maintain national contracts with all major suppliers serving the industry.

Arrowhead's remedial construction and environmental engineering support services are well proven at numerous hazardous waste sites throughout the Central U.S. As both a small business prime and large business subcontractor, Arrowhead has served numerous Federal Agencies and commercial clientele, and has implemented a variety of innovative remedial activities at several of the Nation's most challenging Superfund Sites.

Arrowhead has been continuously serving CH2M Hill as a remedial construction subcontractor since January of 2003. Since this time, we have been awarded 13 major subcontracts with an aggregate value of approximately \$17M.

The majority of these subcontract awards were competitively procured and all were completed under Firm Fixed Price contracts. Arrowhead has successfully completed all contract assignments without a single safety incident or deviation from client approved budgets or schedule. This proven history of past performance will assure the Honeywell Celotex Project Team of a fully vested subcontractor committed to our long-term relationship and the successful outcome of this project.

A review of Arrowheads completed projects for CH2M Hill is presented below:

McGregor NWIRP, Texas – Area M&F Soil Remedy	\$2.1M
McGregor NWIRP, Texas – Building 1238 Demolition	in above
McGregor NWIRP, Texas – Area S Landfill Restoration	in above
McGregor NWIRP, Texas – Groundwater remedy	\$2.9M
Whiteman AFB, Missouri – Landfill 03 Cap repair	\$500K
Langley AFB, Virginia – Construct Athletic Facility on Haz LF	\$700K
Tar Creek Superfund Site, Oklahoma	
Residential Removal Action	\$26K
McGregor NWIRP, Texas – Area M Soil Cell	\$800K
Whiteman AFB, Missouri – Landfill 34 Bank Stabilization	\$360K

Company Experience

Key West Naval Air Station, Florida - Landfill Cap Repair	\$400K
Lincoln ANG, Nebraska	
Soil Removal & Groundwater Treatment	\$650K
Key West Naval Air Station, Florida - Removal Action	\$750K
Kingsville ANGB, Texas - Demolition and Removal Action	\$1.5M

The CH2M Hill / Arrowhead track record of working together successfully in the past serves as a strong indication of what lies ahead. Our resume of past performance dictates the highest probability of success on the upcoming requirements of this contract. In fact, all of the operational, organizational, and administrative approaches presented in this proposal are not only in place, but they have already been effectively applied by and between our respective organizations on past projects. Together, we have established a history of "been there" and "done that" successes with virtually every scope of work element included in this solicitation.

We also offer significant experience with one another's corporate culture and business practices, and most importantly, we have significant collective insight to the desired outcome and mission of the Honeywell Celotex Project.

References

Contract Name & Number: **Nebraska Air National Guard, Site 1 Remedial Excavation Services**
Subcontract 915833

Location of Project: **Lincoln, Nebraska**

Contract Type: **Firm Fixed Price Subcontract**

Contract Amount: **\$830,000**

Project Performance Period: **October 2006 – Present**

Role of Firm: **Subcontractor**

Point of Contract:

Mr. Denton Mauldin

CH2M Hill, Inc.

9191 South Jamaica Street

Englewood, Colorado 80112

(720) 286-2325

Description of Effort:

As a subcontractor to CH2M Hill, Inc., Arrowhead provided HTRW remedial excavation services at the 155th Air Wing, Nebraska Air National Guard (NANG) Base, located in the southeast portion of the Lincoln Municipal Airport in Lincoln, Nebraska. Site 1 is the former petroleum, oil, lubrication (POL) Storage Area at the Base. The POL was comprised of three underground storage tanks (USTs) with a total combined capacity of 555,600 gallons, associated plumbing, and a loading rack. Product stored and dispensed at the facility included AVGAS, JP-4, and JP-8 jet fuel. Over the operating lifetime of the facility,



numerous spills and leaks occurred at Site 1. As a result of these releases, the area beneath the facility and hydraulically downgradient has been impacted by petroleum-related contamination. This area includes the wetlands of Old Oak Creek Channel and the sanitary sewers located south of the POL facility. The primary purpose of the Remedial Action (RA) was to address "hot spots" and the source of measurable free product (LNAPL) and dissolved contaminants (including BTEX compounds) in groundwater. Arrowhead was subcontracted to excavate five areas (totaling 25,000 SF) where mobile LNAPL had been identified. The scope of work further included installation of a biosparge system for reducing dissolved COCs in groundwater. The majority of construction work occurred under a fast-track schedule between October 2006 and January 2007. During this time period, Arrowhead excavated 15,000 CY of POL soil (contaminated and overburden) from ground surface to 12 ft bgs, loaded-out approximately 9,000 tons (357 truck loads) of contaminated soil for off-site disposal as special waste, stockpiled 6,000 CY of mounded soil and 10,000 CY of clean overburden from the excavations, demolished 10,000 SF of concrete pavement overlying two of the excavations, and placed and compacted 15,000 CY of clean backfill material (including crushed rock and overburden soils).

Key Project Elements:

- The project demonstrated Arrowhead's ability to successfully perform large-scale excavation and T&D work at an active military installation.
- The NANG Base was co-located with the Lincoln Municipal Airport. This presented additional challenges with respect to traffic control, air monitoring, and dust suppression.

- The limits of the largest excavations (surface are approximately 25,000 ft²) approached West Oak Avenue, 23rd Street, and the foundation for Building 670. Arrowhead designed an excavation approach to avoid undermining structures, ensure no road closures, and preserve established trees along the street.
- Arrowhead developed a sequenced excavation approach to facilitate live-loading of dump trucks at rate of 40 - 60 trucks / day concurrent with placement of backfill materials.



- Primary and alternate haul routes were developed to avoid conflicts with NANG fueling trucks (continuously traveling between the fuel farm and the main flight line) and tanker trucks delivering fuel to the Base. Arrowhead followed an aggressive vehicle release protocol to ensure that dump trucks entering / leaving the job site did not deposit gravel or soil on streets critical to the Base's fueling activities.
- Portions of concrete parking / loading area, curbs, and median were demolished to provide access to the excavations.
- Excavation work occurred in the vicinity of numerous underground utilities, including two 48-inch sanitary sewer lines (City of Lincoln), a live high voltage power line serving Building 670, water lines along West Oak Avenue, various groundwater monitoring wells, storm sewers, and air distribution piping. Arrowhead coordinated with local utility to de-energize underground electrical prior to excavating. A former electrical utility bank containing ACM conduit was also removed.
- Two excavations were located directly over the City's 48-inch sewer main. Arrowhead employed surgical methods of excavation to remove contaminated soil and bedding sand from beneath the line without causing a breach.
- One excavation was located within a highly-secure munitions storage area east of the main site, immediately adjacent to the security fence. Arrowhead protected the fence during excavation. Arrowhead also restored the parking lot (with crushed rock) and installed a new underground communications conduit.
- Arrowhead engineered a 100-gpm treatment plant to process contaminated groundwater encountered during excavation. The plant consisted of a gravity oil-water-separator, transfer pump, bag filters, and granular activated carbon (GAC) vessels. A self-prime, adjustable flow rate pump was on-hand to transfer storm and groundwater from excavations to WWTP. Arrowhead coordinated with City of Lincoln regarding an effluent discharge permit.
- Construction services during installation of the biosparge system included excavation of 1,000 LF of pipe trench, installation of 7,000 LF of PVC underground piping, and surface completions for 12 biosparge wells.
- Site restoration entailed grading / leveling over 10,000 CY of mounded and surplus overburden soils; placement, compaction, and field testing of backfill material from off-site borrow sources; re-constructing the concrete apron and curbing; and hydroseeding across 3.3 acres.
- Arrowhead constructed a new storm water drainage channel between 23rd Street and concrete drainage channel to the east of the site. An embankment was constructed at the point where the

new channel intersected the Base's running track. An 18-inch corrugated metal pipeline installed beneath the track.

- As part of the storm water protection approach for the site, Arrowhead implemented best management practices (protection of sewer inlets, installation of silt fence, construction of diversion berms, etc.) to minimize sediment loading in storm water run-off.

Contract Name & Number: **NAS Key West, DRMO Removal Action**
Subcontract 808406

Location of Project: **Key West, Florida**

Contract Type: **Firm Fixed Price Subcontract**

Contract Amount: **\$888,235**

Project Performance Period: **January 2007 – March 2007**

Role of Firm: **Subcontractor**

Point of Contract:

Mr. Venky Venkatesh
CH2M Hill Constructors, Inc.
1001 Lakeside Avenue
990 North Point Tower
Cleveland, Ohio 44114
216.623.0402

Description of Effort:

At Naval Air Station (NAS) Key West, Arrowhead completed remedial excavation and related construction activities at the Former Defense Reutilization and Marketing Office (DRMO), located on the Truman Annex in Key West, Florida. The former DRMO site is approximately 6.25 acres in area and was formerly used as a storage facility for new and used military equipment. Over time, contaminants were released to site soils, including lead, arsenic, and polychlorinated biphenyls (PCBs). Prior to this Removal Action (RA), the DRMO was a vacant lot with no military or public activity. The primary objective of the project was to remove contaminated soils from areas of the DRMO where COC concentrations exceeded risk-based cleanup levels, thereby (1) protecting the public from potential exposure to site contaminants and (2) facilitating site closure and future development of the property. Based on the results of remedial investigations, select areas (or "grids") within the DRMO site were recommended for remediation. The excavation areas were grouped into three general categories:

- Group 1 – PCB contaminated areas (24 grids)
- Group 2 – PCB and lead contaminated areas (13 grids)
- Group 3 – Engineering Control areas (7 each) and "Hot Spot" areas (3 each)

The majority of these areas were selected for excavation to 2 - 4 feet below ground surface (bgs) to meet the residential land use standards. The cleanup levels were based on Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for Direct Exposure, as published in Florida Administrative Code (FAC), Chapter 62-777, Table II. In support of the removal action objectives, Arrowhead's scope of work entailed waste characterization, contaminated soil excavation, T&D services, soil confirmation sampling, and site restoration. Driven by an intense fast-track schedule, Arrowhead completed all construction work in 4 weeks. Demobilization occurred on February 23rd, 2007, which was actually three weeks ahead of the Navy's deadline for completing field construction activities.

Arrowhead's approach included pre-characterizing contaminated soils for waste disposal to facilitate live-loading during the construction / excavation phase of the project. Prior to mobilizing for construction, Arrowhead collected thirteen composite soil samples for waste characterization and profiling. Composite samples consisted of random grabs (aliquots) of soil from the excavation grids represented in the sample. Individual aliquots were retrieved from the required sampling interval using a power auger. Samples were analyzed for RCRA Metals and/or PCBs, depending on the COCs for the areas being sampled. Select samples were also submitted for analysis of other waste characterization parameters including, TCLP Full Suite, TCLP Metals, TCL VOCs, TCL SVOCs, PAHs, Pesticidas, Herbicides, and TRPH (FL-PRO). Following receipt of analytical results, Arrowhead prepared and submitted the waste profile package to Waste Management, Inc. (refer to Section 5.1). The contaminated soil was subsequently accepted by Waste Management as a non-hazardous special waste for disposal at Medley Landfill near Miami.

During the project, Arrowhead excavated approximately 3,081 BCY (approximately 4,392 tons) of contaminated soil from 47 areas across the site, including Group 1 grids, Group 2 grids, Hot Spots 1 – 3, and EC Areas A – F. The following table presents the surface area, volume, and depth of each excavation area.

Remedial Excavation Summary, Key West DRMO

Grid	Excavation Area (SF)	Excavation Volume (BCY)	Depth of Excavation (ft)
D2	999	74	2
D3	999	74	2
E1	999	74	2
E2	999	74	2
E3	999	74	2
E7	994	74	2
F1	999	74	2
F10	1010	75	2
F3	999	74	2
F5	1002	74	2
F6	1002	74	2
F8	996	74	2
G1	999	74	2
G10	1000	74	2
G2	999	74	2
O1	999	74	2
O3	1001	74	2
O7	978	72	2
P8	1006	75	2
Q7	970	72	2
X4	1007	75	2
X5	1007	75	2
Y3	1009	75	2
Z3	999	74	2
K4	1004	74	2
P5	1004	74	2
Y8	995	74	2
S4	755	56	2
X1	999	74	2
Q5	3142	233	2
Q8			
X3			
Hot Spot 1			
X10	1842	136	2
Z5			
X9	994	147	4

Grid	Excavation Area (SF)	Excavation Volume (BCY)	Depth of Excavation (ft)
Z11	605	90	4
Hot Spot 3	1009	75	2
Z8	702	52	2
Hot Spot 2			
EC Site A	199	15	2
EC Site A	110	8	2
EC Site B	1166	86	2
EC Site C			
EC Site D	161	12	2
EC Site E	300	39	3.5
EC Site E			
EC Site F	233	17	2
EC Site G	574	43	2
TOTAL		3081 BCY	

The majority of excavations extended to 2 ft bgs. The depth of excavation at areas X9, Z11, and EC-E was approximately 4 ft bgs, corresponding to the approximate top of water table. Arrowhead construction crews verified the depths of excavation in the field using a laser level and elevation rod. Except for the EC areas, each excavation was conducted using the John Deere 200 track hoe. Since the track hoe was prohibited from traversing city streets, a Hitachi 145 mini-excavator was mobilized for the EC areas. The mini-excavator was also more effective for the smaller EC excavations along the streets (i.e. EC Areas B, C, D, E and G) where there were numerous underground utilities and other obstructions. Arrowhead live-load excavated contaminated soils into dump trucks for transportation and off-site disposal (refer to Section 5.0 for additional details). At select excavations, contaminated soils were temporarily stockpiled within the limits of excavation Y3 (an open excavation) until load-out the following day. All concrete and asphalt encountered within the limits of the excavation was removed as part of the excavation and disposed off-site along with the contaminated soil.

Arrowhead saw-cut the asphalt roadway (outer road to Fort Zachary Taylor) at EC Areas B and C prior to excavating. To avoid traffic control issues, the excavation work was conducted between 6:00 PM and 11:00 PM, while the road was closed to vehicular traffic. The excavations were backfilled with crushed rock to road surface elevation. This ensured that the road remained open to vehicles and pedestrians until an asphalt repair crews were mobilized. Crews from Arrowhead then restored the asphalt roadway at EC Areas B and C to match pre-existing construction. This required one lane of traffic at a time to allow continued use of the road while construction activities were in progress. The base rock layer was prepared / compacted using a vibratory plate compactor. Type S-3 hot mix asphalt was then placed in 2-inch lifts and compacted using a smooth-drum roller. Approximately 80 CY of asphalt was required for reconstruction. Arrowhead also repaired the chain-link fence that was temporarily removed to access EC-B, EC-C, Hot Spot 3, and Z11.

Arrowhead implemented an aggressive dust control program during construction. Dump trucks were required to maintain a slow rate of speed while traversing the site. A 2,000-gallon water truck was used apply water to exposed soils, stockpiles, and on-site truck routes. Using a DATARAM aerosol monitor, Arrowhead performed real-time dust monitoring on a continuous basis during excavation work. Real-time dust readings were consistently below the site action level of 5 mg/m³. Following NIOSH methodology, Arrowhead also collected two time-integrated air samples for analysis of total dust and lead.

Confirmation samples were collected prior to conducting the EC Area excavations. The intent of confirmation sampling was to confirm the initial limits of excavation. Sample results were used to determine whether or not contaminated soils within each EC Area extended deeper or wider than the initial, planned limits of excavation. The samples were collected from the base and outside perimeter of each excavation (i.e. sidewall). A total of thirty-nine (39) samples were collected and analyzed for Metals, while an additional six samples were collected and analyzed for PCBs. A power auger was used to extract the sample from the subsurface at each sample location. Based on the results, the COC concentrations exceeded cleanup goals at select locations within EC-A, EC-E, and EC-F. Arrowhead re-excavated contaminated soil to expanded limits as defined by the confirmation sample results, followed by a second round of confirmation samples. The new samples were collected directly from the floor and/or sidewall immediately following excavation.

Crushed Limerock backfill, provided by Cemex's Card Sound Quarry in Florida City, was delivered by dump trucks with an average load weight of 23 tons. A total of 4,780 tons of backfill were imported during the project. Following verification that the limits and depth of excavation had been achieved, Arrowhead placed Crushed Limerock from the base of excavation to original grade. The material was placed and traffic-compacted (proof-rolled) in continuous 12-inch lifts. Excavated areas were graded to provide positive stormwater drainage and prevent ponding or pooling. The final grade was generally consistent with the surrounding ground surface and preconstruction grade. At EC Areas B, C, D, and E, excavation activities disturbed established grass between the outer road and fence line. Following backfill, a 1 – 2 inch layer of commercial topsoil (purchased in 50-lb sacks from Home Depot) was spread across the disturbed areas. Arrowhead crews then spread Bermuda grass seed at an approximate rate of 10 lbs / 1,000 SF. Cypress mulch was also spread across each area.



Arrowhead excavated approximately 3,081 BCY (approximately 4,392 tons) of contaminated soil from 47 areas across the site.



Several of the excavations were located along Quay Road near the Key West Trolley loading area.



Dust suppression was critical due to the proximity of Base residences to the site.



Arrowhead placed 4,780 tons of Crushed Limerock Backfill during the project.

Contract Name & Number: **Tar Creek Site Restoration Activities , 802093**

Location of Project: **Commerce and Picher, Oklahoma**

Contract Type: **Fixed Unit Rate**

Contract Amount: **\$25,000**

Project Performance Period: **February 2005**

Role of Firm: **Subcontractor**

Point of Contract:

Mr. Steven Noe

CH2M Hill Constructors, Inc.

225 East Robinson Street, Suite 505

Orlando, Florida 32801

Brief Description of Effort:

Arrowhead was contracted by CH2M Hill to provide final site grading and restoration activities to eight sites located in Miami County, Oklahoma, as part of the U.S. Environmental Protection Agency (USEPA) Tar Creek Superfund Cleanup Project. The eight residential sites assigned to Arrowhead consisted of dwellings that had previously been remediated to remove soils contaminated with heavy metals resulting from mine tailing wastes and waste by products. These sites were not restored in accordance with municipal grading requirements and did not drain the properties consistent with the City stormwater management plan.

Arrowhead was tasked with assessing the fill requirements necessary to meet CH2M Hill's revised grading plans. At six (6) dwellings, crews conducted utility demarcation; surgical excavation and disposal of previously installed turf and excess fill; fine site grading; drainage swale construction to promote drainage into storm sewer conduits; and revegetation of sod turf.

The performance specifications called for precise grading--1-2" fall from dwelling base foundation to the street (varying 30-75 feet). Conducted during the wet season, saturated conditions adversely affected soil workability and challenged our ability to achieve final grade specifications. To address this challenge, special low-ground pressure equipment was mobilized to reduce equipment load, and reduce rutting and heaving inherent with saturated clay soils. Clay backfill was harvested locally and topsoil was imported to replace unworkable soils. Arrowhead value-engineered a French drain system, both to stabilize subgrade soils and drain standing water from vulnerable cinderblock foundations. Arrowhead self-performed all land surveying to ensure strict compliance with City drainage requirements. Bermuda sod was imported from locations south of Tulsa for placement on all disturbance areas.

Arrowhead was also contracted to replace a leaking water hydrant and to remove four dead trees that were threatening a restored dwelling. Although the hydrant replacement was a simple plumbing task, our Site Project Manager's coordination with local municipal water/code officials required substantial interaction and greatly enhanced communication necessary to interrupt utility service, demarcate the co-located utilities, and complete the repair safely and consistent with city ordinances.

In order to compress the project schedule, Arrowhead subcontracted to a local, minority-owned contractor to mobilize telescopic boom equipment to remove four large oak trees. As a result of the prior soil remediation/backfill adjacent to the tree root systems, the 50+ foot trees had died. Overhanging branches became a substantive hazard to the dwelling. As such, the trees were systematically cut (top to bottom) and the stumps were ground flush to the ground surface. Non-recyclable waste materials were consolidated and hauled to a designated repository for disposal.



Contract Name & Number: **St. Louis Army Ammunition Plant (SLAAP)**
DACW41-00-D-0019, Task Order 002

Location of Project: **St. Louis, Missouri**

Contract Type: **Cost Reimbursable**

Contract Amount: **\$6,186,366**

Project Performance Period: **September 2000- August 2004**

Role of Firm: **Prime**

Point of Contract:

Ms. Sandy Olinger

AMCOM

Building 3206

Redstone Arsenal, Alabama 35898

(256) 313-1718

Description of Effort:

Under a Pre-Placed Remedial Action Contract (PRAC) with USACE, Kansas City District, Arrowhead implemented cradle-to-grave HTRW remediation services at the St. Louis Army Ammunition Plant (SLAAP) in St. Louis, Missouri. The focus of Arrowhead's task order was Building 3 – a 4-story, 170,000 ft² former munitions production building. Arrowhead completed an engineering evaluation/cost analysis (EE/CA) for polychlorinated biphenyl (PCB) contamination in and around Building 3. In addition, Arrowhead designed and implemented a full-scale removal action (RA) to mitigate the PCB contamination, with



the objectives of lifting a notice-of-noncompliance (NON) issued by the Environmental Protection Agency (EPA) and facilitating a Finding of Suitability to Transfer (FOST) in property in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). All remedial activities were executed by Arrowhead under a fast-track schedule in order to lift the oldest NON of all Army facilities. Driven by this schedule, Arrowhead implemented design, remediation, and closure in a period of less than 18 months, inclusive of: a comprehensive Environmental Baseline Survey (EBS) to delineate PCB contamination associated with the building structure and in the soils beneath the building; surgical removal and disposal of approximately 5,000 tons of concrete, soil, piping, and other materials in Building 3 classified as "bulk remediation waste" (PCB concentrations exceeding 50 ppm) under the Toxic Substances Control Act (TSCA); removal and disposal of over 20,000 tons of PCB-contaminated concrete (classified as Missouri special waste), asbestos-containing material (ACM), and lead-based painted (LBP) materials concurrent with demolition of the entire building structure; removal and disposal of a 7,000 tons of TSCA soil, concrete, and gravel beneath the building's foundation and in the vicinity of the former "chip chute" area; soil confirmation sampling; and site restoration.

Key Project Elements:

- Arrowhead demonstrated an ability to surgically remove and dispose contaminated materials as part of a large HTRW construction effort at a closed DoD installation.
- The project was delivered on-schedule, on budget, and with no lost time or recordable incidents.
- Multiple modes of transportation were employed. Arrowhead loaded 12,000 tons of TSCA waste materials for shipment to a TSCA disposal facility located in Wayne, Michigan. Concrete

slabs were loaded onto flatbed trailers, whereas concrete rubble, soil, and other materials (i.e. piping) were loaded into roll-off containers.

- Arrowhead loaded over 20,000 tons of PCB special waste into end-dump trucks for transport to local Subtitle D landfills (Bridgeton and East St. Louis).
- Around the clock security services were provided during construction. Temporary fencing and other barricades were installed around the open excavation following demolition of the building.
- Arrowhead interfaced with City of St. Louis authorities regarding ACM inspections and permit, building demolition permit, and traffic control along Goodfellow Boulevard.
- All underground and aboveground utility lines serving Building 3 were uncovered, capped, and/or de-energized prior to demolition. Arrowhead coordinated service disconnects with local utility companies.
- Arrowhead personnel worked alongside union subcontractors during demolition of the building.
- Construction QC activities were performed during all phases of the project. Arrowhead implemented the USACE three-phase inspection process for all definable features of work (DFWs).
- During site restoration, approximately 68,000 CY of backfill soil was imported from off-site borrow sources along Interstate 70. Arrowhead placed and compacted approximately 3,000 BCY per day until final grade was established. Following backfill activities, the area was graded the area to promote drainage and re-seeded to match surrounding grass areas.

